

CULTURAL COMPETENCE: IMPLICATIONS FOR VALIDITY,  
MEASUREMENT, AND PERFORMANCE

BY

JENNIFER L. KLAFEHN

DISSERTATION

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Doctoral Committee:

Professor Chi-yue Chiu, Chair  
Assistant Professor Daniel A. Newman  
Professor Fritz Drasgow  
Professor Michele J. Gelfand  
Professor Ying-Yi Hong

## ABSTRACT

Findings from research in educational and cognitive psychology have shown that metacognition, defined as the monitoring and regulation of one's knowledge and learning processes (Flavell, 1979), exerts substantial influence on individual performance (Swanson, 1990). The majority of this research, however, has only examined metacognitive skill as it applies to academic settings (Tobias & Everson, 2002; Veenman & Spaans, 2005). Other contexts, such as cross-cultural settings, may equally benefit from such applications. This dissertation contributes to research on metacognition in two distinct ways: (1) by examining the construct validity of a popular self-report measure of cultural metacognition, and (2) by examining the effects of a new performance-based measure of metacognitive skill on performance in cross-cultural settings. Results from Study 1 indicated that cultural metacognition is distinct from the Big Five, but that the measure of cultural metacognition is highly correlated with other subfacets of cultural competence. Results from Study 2 were largely inconclusive due to low statistical power and methodological concerns with the performance-based measure of metacognition, however, post hoc analyses illuminated some potential relationships between cross-cultural adaptation and personality. Implications for the use of measures of cultural metacognition in future research and organizational contexts are discussed.

*To my parents, Michael and Karen Klafehn,  
for their patience, love, and support*

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## CHAPTER 1: INTRODUCTION

A growing concern among organizations is the appropriate selection and training of culturally competent employees. Now, more than ever, organizations are realizing the importance of expanding their business globally and the impact such expansion is likely to have on their ability to remain competitive. The influence of this trend can be seen in a variety of places. For example, the number of opportunities to work outside one's native country has risen dramatically (Chiu & Hong, 2006). According to a 2009 Bureau of Economic Analysis press release, worldwide employment by U.S. multinational firms increased 2.9% in 2007 to over 30 million workers, while employment within the U.S. increased by only 1.0% (Bureau of Economic Analysis, 2009). Additionally, more than half of the largest economies in the world are not countries themselves, but rather multinational firms (Chiu & Hong, 2006). This can be attributable to a near tenfold increase in multinational companies worldwide, from a mere 7,258 in 1970 to almost 80,000 in 2006 (United Nations Conference on Trade and Development, 2008). Clearly, the impact of globalization is worthy of attention from organizations and academicians alike.

Fortunately, researchers in the areas of organizational and cross-cultural psychology, international business, and human resources have answered this call with a multitude of studies dedicated to the development and management of globalizing industries. Though there are several topics in need of addressing, one of the major goals of this research is to identify the critical psychological factors that predict adaptation and successful performance in cross-cultural situations (for a review, see Mol, Born, Willemsen, & van der Molen, 2005). This goal is particularly important given that many employees have had little to no experience working in foreign environments or managing foreign people. Thus, by identifying which elements

contribute to exemplary performance abroad, organizations can better prepare themselves and their employees for these future challenges.

One such element that is likely to play a role in an employee's ability to adapt to new environments is the acquisition and effective deployment of cultural knowledge. Indeed, a major hurdle to developing culturally competent sojourners is teaching them not only *what* they need to know, but also *how to use* what they know. In this sense, learning is a two-step process: one must first (1) acquire knowledge about a particular culture, and then (2) understand how he or she should apply it so as to maximize performance in that culture. Unfortunately, the vast majority of research on this topic has been limited to organizational training contexts, most of which tend to emphasize only the first step in the learning process: knowledge acquisition (e.g., Fielder, Mitchell, & Triandis, 1971; see also Brislin, Cushner, Cherrie, Yong, 1986, Kealey & Protheroe, 1996). Very few to no training modules teach employees how to effectively use cultural knowledge once they have acquired it. Consequently, employees are left with a narrow set of information (e.g., facts, figures, and behavioral rules) that they can only apply to specific cultural contexts.

Luckily, the areas of educational and cognitive psychology have enjoyed a rich history of research dedicated to the topic of self-regulated learning and can aid in addressing this issue explicitly. Like cross-cultural and organizational psychologists, educational and cognitive psychologists recognize the importance of knowledge acquisition in learning contexts. Educational and cognitive psychologists, however, take this approach one step further, suggesting that the mere acquisition of knowledge is not sufficient to promote full and effective learning. In addition, they suggest that *metacognition*, or thinking about one's knowledge, is just

as important to the learning process as is the acquisition of context-relevant information (Flavell, 1976, 1979; Swanson, 1990).

To date, metacognition has played a major role in the literature dedicated to learning in educational contexts, such as solving math problems, writing essays, or comprehending reading passages. Despite its prevalence in the educational and cognitive domains, however, research examining the effects of metacognition and metacognitive skill on performance in cross-cultural contexts is still in its infancy. Receiving even less attention is research dedicated to the assessment of metacognition in cultural contexts. To date, the majority of assessments purporting to measure culturally-contextualized metacognitive skill (and its related factors) employ self-report methodologies that are prone to faking and self-enhancement bias. As such, the question of whether these assessments are accurate reflections of metacognitive skill still remains. The present research intends to fill this void by a) exploring ways in which metacognitive skill can influence adaptive learning and behavior in culturally-meaningful environments, and b) examining both current and potential new avenues by which to assess such skills. Specifically, I suggest that applying theories from educational and cognitive psychology to extant work on cultural competence will aid researchers in better conceptualizing metacognition and measuring its effects on cross-cultural performance.

The subsequent thesis is organized in the following fashion: it begins with a general overview of metacognitive theory and its applications to self-regulated learning. I also discuss the compensatory role of metacognition in situations where access to context-specific knowledge is limited and address the ways in which metacognitive skill is likely to influence performance, with a focus on cross-cultural contexts, in particular. Following this discussion, I introduce two studies that seek to complement and extend previous research on the assessment of

metacognition in cross-cultural contexts. The purpose of Study 1 was to examine the construct validity of a popular self-report measure of cultural metacognition with respect to a self-report measure of the Big Five personality traits. The purpose of Study 2 was to build upon the findings of Study 1 by proposing an alternative measure of cultural metacognition that is performance-based, rather than self-report, and to validate it on a small sample of international students. I conclude with a brief discussion on how the findings from both studies can serve to influence future research in the area of cross-cultural performance as well as the strategies organizations apply in addressing culture-relevant concerns.



## CHAPTER 2: LITERATURE REVIEW

### 2.1 The Role of Metacognition in Learning and Problem-Solving

Literally defined as “thinking about thinking” (Dunlosky, Serra, & Baker, 2007), metacognition encompasses the awareness, processing, and monitoring of cognitive information. Whether or not we realize it, metacognition is an integral part of our everyday lives. It helps us make use of the knowledge we have and allows us to apply it in novel ways across situations. Furthermore, it encourages us to seek out latent theories, principles, and rules that connect our knowledge, thereby enhancing our ability to identify unique patterns and solve otherwise complex problems.

#### 2.1.1 A Brief History of Metacognition

Scientists and philosophers dating as far back as Plato and Aristotle have recognized the importance of metacognition to human development and learning (Aristotle, trans. 1993; Brown, 1987). For example, in *De Anima*, a philosophical treatise on the human mind, Aristotle makes a distinction between possible intellect and agent intellect. According to Aristotle, possible intellect is the mental storage space for all things that we sense or perceive in the universe. Agent intellect, on the other hand, represents the process of recalling these sensed objects and ideas and forming them into cohesive, meaningful thoughts. From a modern psychological perspective, possible intellect is synonymous with the acquisition of knowledge, whereas agent intellect is like metacognition in that it connects knowledge and applies it in useful ways.

Nearly two thousand years later, John Locke wrote of a similar psychological phenomenon in *An Essay Concerning Human Understanding* (Locke, 1690/1838):

“This source of ideas every man has wholly in himself; and though it be not sense, as having nothing to do with external objects, yet it is very like it, and might properly

enough be called *internal sense*. But as I call the other Sensation, so I call this REFLECTION, the ideas it affords being such only as the mind gets by reflecting on its own operations within itself. By reflection then, in the following part of this discourse, I would be understood to mean, that notice which the mind takes of its own operations, and the manner of them, by reason whereof there come to be ideas of these operations in the understanding.” (p. 51)

Though Locke refers to metacognition here as “reflection,” the essence of the concept remains the same. That is, we think not only by sensing what is external to us, but also by reflecting on what is *internal* to us, namely, our own thoughts.

### 2.1.2 Metacognition: Models and Theories

Despite the attention it has received from early philosophers, metacognition has only been an explicit focus of psychological research for the past few decades. Indeed, when most individuals talk about “metacognition” or “metacognitive processes,” they are not referring to Aristotle or Locke, but rather the work of Flavell and colleagues in the mid to late 1970s. The term “metacognition” originated out of earlier work conducted on *metamemory*, a term Flavell himself introduced in 1971 to reflect children’s knowledge or awareness of their own memory. This idea was later broadened to include other types of cognitive processes, such as monitoring and regulation, eventually giving rise to the term *metacognition*. Several researchers have offered varying degrees of definitions for metacognition. As mentioned previously, some refer to metacognition by its literal translation: “cognition about cognition”; most psychologists, however, agree that this definition is overly simplistic because it fails to capture the construct’s multifaceted nature (McCormick, 2003). Others have used it as a “catch-all” for concepts related

to executive processes and higher-order functioning (Brown, 1987; Veenman, Van Hout-Wolters, & Afflerbach, 2006).

One of the most commonly accepted definitions of metacognition was provided by Flavell (1976). According to Flavell, metacognition is “knowledge concerning one’s own cognitive processes and products or anything related to them” (p. 232). In similar words, metacognition encompasses everything that pertains to the monitoring, assessment, or planning of one’s learning (Brown, 1980; Tobias & Everson, 2002). In Flavell’s model, metacognitive development is theorized to occur via interactions between tasks, strategies, and two components of metacognition: metacognitive knowledge and metacognitive experiences (1979). The first component, metacognitive knowledge, encompasses the knowledge and beliefs individuals have about cognitive processes (Dunlosky, et al., 2007). Flavell (1979) believed that individuals stored knowledge about cognition much in the same way they stored knowledge about things or ideas. For example, a student may be aware that multiple choice questions are easier for her to answer than essay questions. This awareness constitutes part of the student’s metacognitive knowledge about her performance on different types of test questions. The second component, metacognitive experiences, involves the regulation and monitoring of metacognitive knowledge (Dunlosky, et al., 2007). Metacognitive experiences are essential to the developmental process because they allow individuals to alter their metacognitive knowledge by adding, deleting, or revising information (McCormick, 2003). Metacognitive experiences also play an important role in the establishment or revision of goals, as well as in the activation of various cognitive and metacognitive strategies (Flavell, 1979). Our student, aware that some test questions are easier for her to answer than others, will likely be influenced by metacognitive experiences when making decisions or planning goals concerning her academic performance. For instance, on an

upcoming exam, she may decide to answer the multiple-choice questions first so that she has more time to answer the essay questions later (strategy); likewise, she may find it more realistic to fully answer only a portion of the essay questions (goal), rather than rushing to finish each one of them haphazardly before time is up. Together, metacognitive knowledge and metacognitive experiences contribute to the successful development of metacognition. A deficiency in either component implies that one either lacks awareness of his or her cognitive processes or lacks the ability to monitor and control those processes.

### *2.1.3 Distinguishing Metacognition from Related Constructs*

Though metacognition has largely been defined and referred to as an independent process, its pronounced similarity to certain constructs may suggest otherwise. Of particular interest is the relationship between metacognition and intelligence, as well as that between metacognition and self-efficacy; these relationships bear significance due to the important roles each has been shown to play in learning and performance (Bandura, 1986; Hunter, 1986; Hunter & Hunter, 1984; Stajkovic & Luthans, 1998). Given that metacognition, intelligence, and self-efficacy jointly influence the ways in which individuals acquire and employ knowledge, it is necessary to conceptually and empirically differentiate them from one another so that their unique contributions can be identified.

*Intelligence.* Questions continue to be raised regarding the relationship between metacognition and intelligence. Mainly, researchers have been concerned with the extent to which metacognition is distinct from intelligence and vice versa. Some researchers, for instance, believe that metacognition is a core component of intelligence. Because of this, metacognition is thought to lack the power to predict learning and performance independent of cognitive ability; this view is referred to by some as the *intelligence* model of metacognition (Veenman, Elshout,

& Meijer, 1997). Theoretical models of intelligence that include a metacognitive component as part of their framework are perhaps most supportive of this perspective. One example is Sternberg's triarchic theory of intelligence, which features a subfacet known as "metacomponents" (Sternberg, 1985). Similar to metacognition, metacomponents are executive processes that help guide, control, and evaluate the activity of lower-level cognitive components. Specifically, they dictate how, when, and where an individual should allocate cognitive resources to successfully complete a task. According to Sternberg, metacomponents comprise an intrinsic part of one's cognitive repertoire, and are therefore largely indistinguishable from intelligence itself.

Other researchers have approached the relationship between metacognition and intelligence from a different perspective. For example, some researchers contend that, though both imperative to learning and performance, metacognition and intelligence operate as entirely separate constructs; this view is commonly referred to as the *independency* model (Veenman et al., 1997). That is, metacognition predicts learning and performance independent of intelligence. Some studies have shown support for the independency model (e.g., Swanson, 1990); however, most researchers agree that these findings are largely due to experimental design rather than true psychological differences (Veenman & Elshout, 1991). In fact, in a follow-up study, Swanson himself demonstrated that metacognition operated only partially independent of intelligence (Swanson, Rubadeau, & Christie, 1991), a finding more compatible with the third model of metacognition, the *mixed* model (Veenman, 1993).

The mixed model, as its name implies, is a blend of both models of metacognition. Like the intelligence model, it contends that metacognition is related to intelligence, such that individuals who are more intelligent tend to have higher levels of metacognitive skill ( $r = .52$ ;

Veenman et al., 1997). Like the independency model, however, the mixed model also states that metacognition can act independently of intelligence, and may even compensate for it when it is insufficient or absent (see *The Compensatory Role of Metacognition*). Out of the three models, the mixed model has received the greatest amount of empirical support. For example, research examining the effects of metacognition in learning scenarios has demonstrated that metacognitive skill plays a significantly larger role in the learning performance of novices than in the learning performance of experts (Veenman & Elshout, 1999; Veenman et al., 1997). Similarly, the relationship between metacognitive skill and learning performance has been repeatedly shown to be moderated by task complexity, such that metacognitive skill influences performance only for those tasks which are highly complex (Gist & Mitchell, 1992; Veenman, Prins, & Elshout, 2002; Veenman & Spaans, 2005). For tasks that are less complex (or less novel), it is intelligence, rather than metacognition, that tends to guide performance.

*Fluid intelligence.* Connections have also been drawn between metacognition and fluid intelligence (*Gf*; Sternberg, 1985). *Gf* is a facet of intelligence that reflects basic reasoning and problem-solving abilities, as well as higher-order mental processes (Cattell, 1971; Drasgow, 2003). In general, it is measured through tasks that involve some degree of “inductive, deductive, conjunctive, and disjunctive reasoning”, such as classifications, analogies, syllogisms, and series completions (Horn, 1997; Sternberg, 1985). Perhaps the most well-known measure of *Gf* is Raven’s Progressive Matrices (RPM; Raven, Court, & Raven, 1979), a series completion task that instructs examinees to choose symbols that most logically complete particular patterns. Validation studies of the RPM have shown that high scorers are characterized by their abilities to (a) induce abstract relations among stimuli, and (b) dynamically manage problem-solving goals in working memory (Carpenter, Just, & Shell, 1990).

At first glance, the processes governing performance on the RPM appear markedly similar to the processes described in definitions and models of metacognition. This raises the obvious question, “are tests of fluid intelligence actually measuring metacognition (or vice versa)?” Several studies examining the relationship between self-estimations of performance, a marker of metacognitive skill, and the RPM have shown this not to be the case (Stankov, 1998; Stankov & Crawford, 1997; Pallier et al., 2002). For example, Stankov (2000) found that both exploratory and confirmatory factor analyses of participants’ estimated and actual performance on the RPM and perceptual knowledge tests consistently yielded four distinct factors: a fluid intelligence factor (i.e., high test scores), a mental speed factor (i.e., time to complete test), a self-awareness or predictive accuracy factor (i.e., performance estimations), and a “Raven’s” factor (i.e., method). Furthermore, the correlation between the predictive accuracy factor and the fluid intelligence factor was 0.39; the correlation between the predictive accuracy factor and the Raven’s factor was even lower,  $r = 0.24$ . Thus, it appears that measures of metacognition and fluid intelligence, though certainly related to one another, do not tap into the same construct. As some have suggested, their relationship may be better characterized as mediated or interacting rather than overlapping (Pallier et al., 2002; Veenman & Spaans, 2005)

*Self-efficacy.* Self-efficacy is the belief in one’s ability to organize and execute the course of action necessary to obtain a desired goal or outcome (Bandura, 1977, 1994). Self-efficacy is vital to any type of learning or performance context because it is largely responsible for how individuals feel, think, and motivate themselves to behave. However, because it is a belief, self-efficacy does not necessarily reflect an accurate portrayal of an individual’s true ability. Indeed, judgments of self-efficacy can stem from a variety of sources (e.g., feedback, social comparison,

verbal persuasion), and are therefore prone to change or manipulation depending on the person or the performance context (Bandura, 1977; Bouffard-Bouchard & Pinard, 1988).

Given the extent to which self-efficacy has been shown to influence learning and skill acquisition (Bandura, 1982; Kanfer & Ackerman, 1989; Stajkovic & Luthans, 1998), it naturally follows that research has explored the effects of self-efficacy on other determinants of performance, such as metacognition. Specifically, these studies have investigated the relationship between self-efficacy and self-regulatory processes (i.e., metacognition), as well as how that relationship influences performance.

It should be first understood that self-efficacy and metacognition, though related ( $r = .63$ ; Coutinho, 2008), are not the same construct (Moores, Chang, & Smith, 2006). As previously stated, self-efficacy represents an individual's belief in his or her ability to perform a particular task. It is not a prediction about performance nor is it a behavioral intention (Maddux, 2002). This is in opposition to metacognition, which is generally construed as a skill, as it relies more heavily on individuals' knowledge of their actual abilities, rather than what they believe they can do with those abilities. For example, in learning contexts, knowing what strategies work and why they work (metacognition) is different from believing one is able to use those strategies effectively (self-efficacy). Metacognition also tends to demonstrate relative stability across performance domains (Veenman et al., 1997); self-efficacy, on the other hand, is susceptible to both internal (e.g., self-esteem) and external (e.g., feedback) influences (see Gist & Mitchell, 1992).

While many studies have documented the independent contributions of self-efficacy and metacognition, only a few have explored their combined effects on performance (Bouffard-Bouchard et al., 1991; Coutinho, 2006; Kanfer & Ackerman, 1989; Moores et al., 2006). The



majority of these studies allude to some sort of mediated relationship between self-efficacy, metacognition, and performance. Though the precise direction of this mediation is still in question, the largest (and most valid) support has been found for a self-efficacy-performance relationship that is partially mediated by metacognition. This is in line with previous research that has shown a positive correlation between self-efficacy and performance (Bandura, 1982). Researchers investigating metacognition's mediating role suggest that this correlation is partly due to the motivating effect high self-efficacy has on individuals' employment of metacognitive skills. In other words, individuals who strongly believe in their ability to successfully complete a task will be more likely to use their metacognitive skills to this end. Support for this contention was found by Bouffard-Bouchard and colleagues (1991), such that individuals with higher levels of self-efficacy demonstrated more active control of time, greater task persistence, and fewer rejections of correct hypotheses. Thus, it appears that the use of metacognitive skills may be partially dependent on individuals' beliefs about their abilities to perform well on a particular task. Because of this, self-efficacy will be included as a variable of interest in the present study.

#### *2.1.4 The Compensatory Role of Metacognition*

In cross-cultural contexts, having high levels of metacognitive skill is essential. Not only must individuals be aware of their roles or positions in a new culture, but they must also be flexible in their thoughts and behaviors toward the people with whom they interact. This metacognitive flexibility is crucial to adaptive performance because it enables individuals to suspend their judgments of other cultures, while simultaneously looking for creative solutions to problems they might encounter. It also provides them with the needed skills to amend and/or revise their cultural theories to reflect changes in their beliefs, experiences, and expectations.

Metacognitive skill is especially important in cases where individuals' previously acquired knowledge about a culture is contradicted by what they actually experience in that culture. For instance, an American manager may spend several weeks preparing for a new position in a foreign country by reading about the local customs, behavioral norms, and cultural traditions practiced there. Upon arrival to his new job, however, the manager finds that the country and its people are nothing like what he read about in textbooks. The manager's conundrum, though unfortunate, highlights an issue that is all too familiar for organizations dealing with expatriate failure (Black & Mendenhall, 1990). That issue, of course, is the insufficiency of expatriates' cultural knowledge. It should be noted that lacking the appropriate knowledge to perform well in a new culture is by no means the fault of the sojourner; too often, the overly narrow, even stereotyped, focus of training materials is to blame. Though it would be incorrect to claim that culture-preparatory books and workshops are not created in the best interests of their readers and participants, it would be also be wrong to claim that they are capable of capturing the enormous variance that exists within individual cultures. For example, preliminary work conducted by Klafehn and Tay (2009) has shown that greater differences in motivational preferences exist within individual cultures than across cultures. Furthermore, cultures can share many similar group profiles (e.g. regulatory focus, response style), even when those cultures come from opposite sides of the individualism-collectivism spectrum (Triandis, 1995). Unfortunately, cultural training materials rarely capture these nuances, leading sojourners to develop a one-sided perspective of the culture to which they are traveling.

Given the relative frequency with which these problems occur, it is not surprising that many expatriates find themselves in situations where their previously acquired cultural knowledge is unreliable or deficient. In some extreme instances, the use of unreliable knowledge

may actually *create* problems for the individual. Thus, individuals must come to rely on some other sort of cognitive mechanism to help them adapt to their new environment. Research on the compensatory role of metacognition and, more specifically, metacognitive skill, may help shed some light on this issue.

In general, situations that are complex, novel, or unstructured are more difficult to navigate because they lack overt cues that inform individuals about how to apply their knowledge (Fernandez-Duque, Baird, & Posner, 2006). For example, multiple choice questions tend to be easier to answer than essay questions because they give more information about what knowledge the individual needs to access. Essay questions, on the other hand, are much broader and require individuals to think about their knowledge in novel, less obvious ways. In these types of non-routine or unstructured situations, individuals must learn to rely on their metacognitive skills, rather than cognitive skills, to solve problems. This claim is substantiated by research on metacognition and performance which has shown that, in these types of situations, individuals who employ metacognitive skills succeed at far higher rates than those who do not employ such skills (Flavell, Friedrichs, & Hoyt, 1970; Tobias & Everson, 2002). For example, in a study examining the performance of fourth and fifth graders, Swanson (1990) found that students with high metacognitive skill were more efficient at solving novel tasks (i.e., required fewer steps to reach a solution) than were students with low metacognitive skill, regardless of overall aptitude. Apparently, high aptitude was only important to performance when students' metacognitive skill was low. Even so, students high in metacognitive skill but low in general aptitude performed significantly better than students low in metacognitive skill but high in general aptitude. Thus, metacognition appeared to compensate for a lack of cognitive ability by providing individuals with an alternative set of tools they could use to solve problems efficiently (e.g., task analysis,

hypothesis testing, strategy selection; Veenman & Spaans, 2005). This may give hope to individuals who have difficulty learning information, as having high metacognitive skill may allow them to perform at levels similar to those with higher cognitive ability.

Research in the area of cognitive neuroscience has shown similar results regarding the role of metacognition in unstructured situations. It is widely understood that the brain's executive system is responsible for the functioning and execution of higher-order processes, such as metacognition, (Fernandez-Duque et al., 2006; Shimamura, 2008), as well as the control and direction of lower-order processes, such as memory retention (Stuss, 2007). An interesting theory proposed by Norman and Shallice (1986) suggests that the purpose of the executive system is to adapt "lower level schemas" (i.e., knowledge) to meet the goals of the individual. In this sense, knowledge can be continuously adjusted and readjusted in response to changes in one's intentions or courses of action. If the executive system were to be damaged or altogether absent, an individual would not be able to process information flexibly; rather, he or she would be bound by the external cues from the environment that inform the system about what information should be processed and when (Posner, DiGirolamo, & Fernandez-Duque, 1997). In other words, without an executive system, knowledge becomes very context-specific and difficult to generalize to other situations.

Most cognitive neuroscientists agree that the frontal lobes, particularly the prefrontal cortex (PFC), are in some way implicated in the control of executive functions (Stuss, 2007). Several studies have shown that prefrontal areas of the brain, notably the lateral prefrontal cortex (LPFC) and ventral prefrontal cortex (VPFC), are involved in the performance of tasks assessing self-regulation (Levine, Dawson, Boutet, Schwartz, & Stuss, 2000), self-awareness (Stuss & Benson, 1986), complex planning, and decision making (Bechara, Damasio, Damasio, &

Anderson, 1994). Particularly relevant to this discussion is the finding that individuals with frontal lesions or brain injuries have great difficulty performing in unstructured situations (Bechara et al., 1994; Levine et al., 2000; Levine et al., 1998). A study by Goel and colleagues (1997), for example, found that patients suffering from frontal lobe lesions were significantly worse at solving an unstructured financial planning task than were participants in the control group. Specifically, patients had difficulty (a) organizing their problem space, (b) allocating time and effort to each phase of the task, (c) grappling with the fact that there were no right or wrong answers, and (d) generating feedback on their performance. Interestingly enough, there were no significant differences found between the patients and the control group on local level assessments of neuropsychological functioning. In other words, patients only experienced deficits to their performance when attempting to solve unstructured problems; patients' lower-level operations (e.g., forming sentences, ordering preconceived tasks) were indistinguishable from those used by the control group. Some researchers suggest that this discrepancy may be due to metacognition and cognitive ability being located in different parts of the brain (Stuss, 2007). If this is the case, frontal lobe lesions are unlikely to affect one's ability to recall declarative knowledge or engage in routine tasks.

Overall, the findings discussed here suggest that metacognition is critical to the efficient processing of one's knowledge. Without metacognition, individuals tend to behave, as one psychologist put it, "like floating ships without rudders." Moreover, metacognition may play an important role in compensating for cognitive ability when knowledge is unavailable or inapplicable, such as in situations characterized by novelty, complexity, or a lack of structure. These findings bear particular relevance to the study of cross-cultural performance, given that cross-cultural interactions, by their very nature, tend to be novel, complex, and unstructured. In

the following section, I will address the research that has been conducted on metacognition in cross-cultural settings, and highlight its connections to the findings described above.

## **2.2 The Role of Metacognition in Cross-Cultural Performance**

It has been widely accepted that one of the best predictors of job performance is job-specific knowledge (Schmidt, Hunter, & Outerbridge, 1986). Not surprisingly, a great deal of research has been dedicated to assessing the ways in which employees acquire and use their knowledge on a day to day basis (see Huber, 1991). Despite the importance of these findings, relatively few researchers have explored the effects of metacognition on organizational performance.<sup>1</sup> As previously stated, metacognition plays a major role in the monitoring and regulation of knowledge. These processes are particularly important when external cues normally signaling performance are not present. While on the job, employees are likely to encounter a variety of situations that lack these context-specific cues. For example, prioritizing one's schedule, dealing with difficult clients, creating a presentation, or asking for a raise are all situations involving moderate to high degrees of ambiguity. In these situations, tacit knowledge alone will be insufficient to resolve inherent issues. Rather, employees must rely on metacognitive skills in order to arrive at an appropriate solution.

Though the number of studies examining metacognition in organizational settings is small, even *fewer* researchers have addressed its effects on performance in cross-cultural settings. Two exceptions to this are Earley and Ang's (2003) four-facet model of cultural intelligence, and Thomas's (2008) systems model of cultural intelligence.

### *2.2.1 The Four-Facet Model of Cultural Intelligence*

Cultural intelligence, also referred to as cultural competence, is defined as "an individual's capability to function and manage effectively in culturally diverse settings" (Ang et

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<sup>1</sup> An exception to this is research conducted by Munby, Hutchinson, and colleagues (2002, 2003)

al., 2007, p. 336). Research on cultural intelligence grew out of a perceived need to identify and examine the reasons why some individuals adjusted quicker and more easily to new cultures, while others did not. The term itself was chosen by Earley and Ang to reflect the various theories of intelligence, namely social (Thorndike, 1920), emotional (Salovey & Mayer, 1990), and practical (Neisser, 1976) intelligence, on which the concept was originally based.

Earley and Ang's (2003) preliminary model of cultural intelligence was composed of three distinct facets: cognitive cultural intelligence, motivational cultural intelligence, and behavioral cultural intelligence. Later, the cognitive facet was split into two separate facets, cognitive cultural intelligence and metacognitive cultural intelligence, to reflect differences between the acquisition and retention of cultural knowledge versus the problem-solving and reasoning skills used to process it. Specifically, cognitive cultural intelligence refers to an individual's knowledge of cultural values, norms, beliefs, and practices. Conversely, metacognitive cultural intelligence refers to an individual's ability to evaluate and interpret their cultural knowledge and culturally-relevant schemas. Motivational cultural intelligence refers to an individual's willingness or desire to seek out and continuously learn from cross-cultural experiences. Finally, behavioral cultural intelligence refers to an individual's ability to display culturally appropriate verbal and nonverbal behaviors during cross-cultural interactions. Together, all four facets are viewed as equally important to the development of cultural intelligence. However, for purposes pertaining to the present discussion, only metacognitive cultural intelligence will be addressed in further detail.

As previously mentioned, metacognitive cultural intelligence refers to one's capacity to evaluate and interpret cultural knowledge (Earley & Ang, 2003). Specifically, it involves thinking critically about cultural knowledge, evaluating the quality and accuracy of that

knowledge, and making necessary revisions should that knowledge be found faulty or inconsistent (Van Dyne et al. 2009). Metacognitive cultural intelligence is an extremely important component of cultural intelligence because it enables individuals to think flexibly about culturally-relevant information. It also encourages individuals to think of themselves as part of the cultural environment; in other words, it helps individuals recognize the potential influence they may have on the thoughts, feelings, and behaviors of others. The combination of self-awareness and cognitive flexibility contributes to the ease with which culturally-intelligent individuals adapt to and thrive in new surroundings. At the same time, it discourages the adoption of contextualized thinking patterns that are likely to hinder acculturation to novel environments (Klafehn, Banerjee, & Chiu, 2008).

### *2.2.2 The Systems Model of Cultural Intelligence*

Thomas and colleagues (2008) proposed a different model of cultural intelligence that focuses largely on the influence of cultural metacognition. According to Thomas et al., cultural intelligence operates as a system of interacting abilities joined together by cultural metacognition. Through the metacognitive monitoring and regulation of cultural knowledge and skills, cultural intelligence is developed dynamically and can be adjusted in response to changes in the environment. This view of cultural intelligence is distinct from Earley and Ang's (2003) model which posits cultural intelligence as a static construct composed of relatively independent elements.

Thomas and colleagues' model also diverges from previous models by eschewing motivation and behavior as components of cultural intelligence. They argue that, while motivation and behavior are certainly implicated in cross-cultural performance, they are better construed as intervening or outcome variables of cultural intelligence.



## 2.3 Measuring Metacognitive Skill

In the following paragraphs, I will introduce several popular approaches for measuring metacognitive skill. Included in this section will be a discussion of the issues associated with various measures and definitions of metacognition, as well as a summary of the predictive validity of metacognitive skill for various performance contexts.

Researchers who study metacognition use a wide variety of measures to assess metacognitive skill. These measures can be separated into two distinct categories based on when in the performance session they are administered. Measures that are administered before or after a performance session are referred to as *offline* measures (Van Hout-Wolters, 2000). Offline measures require individuals to either estimate (prospective) or recall (retrospective) their performance. For this reason, offline measures rely heavily on self-assessments (e.g., self-reports or interviews). Given that self-assessments are prone to estimation error and biases (Kruger & Dunning, 1999; Paulhus, 1984), offline measures tend to be less valid predictors of learning performance than are other measures of metacognitive skill, such as *online* measures (Veenman et al., 2003; Veenman, 2005). Online measures, also known as concurrent measures (Desoete, 2008), are administered *during* a performance session. Overall, online measures tend to show higher predictive validity than offline measures ( $r = .30$  to  $.45$  for online measures, vs.  $r = -.04$  to  $.03$  (ns) for offline measures; Veenman, Prins, & Verheij, 2003) because they do not rely on participants' abilities to estimate or remember how they performed. For example, online measures may ask participants to verbalize or make note of their performance as they progress; others involve direct observation or analysis by the experimenter. Some of the most commonly used online measures include think-aloud protocols (Afflerbach, 2000; Ericsson & Simon, 1980; 1984) and confidence judgments (Tobias & Everson, 1997; 2002). A brief discussion of each of

these measures follows, as well as a description of the measure of metacognitive skill to be employed in the present study.

### *2.3.1 Think-aloud protocols*

Think-aloud protocols were among the first types of behavioral measures designed to assess metacognitive skill. Specifically, think-aloud protocols focus on the metacognitive experiences component of metacognitive skill, such that they assess individuals' abilities to monitor and regulate existing knowledge. The procedure is deceptively simple: instruct participants to verbalize "everything they think and everything that occurs to them while performing the task, no matter how trivial it may seem" (Hayes & Flower, 1980, p. 4), and then record their responses. The experimenter is not allowed to intervene unless the participant falls silent or becomes distracted (Veenman & Spaans, 2005). At this point, the experimenter can encourage the participant to continue thinking aloud by use of a standard prompt (e.g. "Please continue to think aloud").

Once participants' responses are recorded, they are transcribed and analyzed for content. Think-aloud protocols generally follow a similar format of analysis; that is, raters are trained to identify whether a number of predetermined metacognitive activities are present in participants' verbal responses. For example, on a test of math ability, Desoete (2003) coded for the presence of 40 different activities that fell into one of four categories: prediction, planning, monitoring, and evaluation. Activities ranged from "underlining important words" to "selecting the calculation needed" to "checking the answer with the estimated outcome" (p. 196). If the activity is present, the participant receives 1 point; if the activity is absent, the participant receives 0 points. In some cases, half points are also given for activities that were initiated, but not

completed. Points are then summed up for each item on the test to determine an item-level metacognition score, and averaged across all items to determine a total metacognition score.

In general, the statistical properties of think-aloud protocols tend to be quite stable. Reliabilities of protocol analyses (Cronbach's alpha) tend to fall in the mid to upper 80s (Desoete, 2003; Veenman & Spaans, 2005), while convergent validity with other measures of metacognition, as well as predictive validity across a variety of contexts, is routinely demonstrated (Ericsson & Simon, 1993; Veenman & Spaans, 2005).

### *2.3.2 Confidence Judgments*

Despite their popularity and widespread use, think-aloud protocols have several major drawbacks (Ward & Traweek, 1993). For instance, they are often very time-consuming for experimenters to administer and analyze (Veenman et al., 2006). There have also been criticisms claiming that thinking aloud while engaging in particular tasks interferes with participants' performance (Wilson, 1994), although some researchers have demonstrated this not to be the case (Ericsson & Simon, 1984). Finally, variables such as age, verbal fluency, self-monitoring, anxiety, motivation, and cultural background are believed to affect the number and quality of verbal responses participants give (Garner & Alexander, 1989; Peng, Nisbett, & Wong, 1997; Ward & Traweek, 1993).

It is also noteworthy to mention that think-aloud protocols only capture one element of metacognitive skill: metacognitive experiences. They do not assess individuals' metacognitive knowledge, that is, the level of awareness and accuracy individuals possess about their acquired knowledge. Thus, in order to accurately assess both facets of metacognitive skill, a measure of metacognitive knowledge would have to be utilized, as well. One method that fulfills this requirement is confidence judgments. Generally speaking, confidence judgments are predictions

participants make about their performance. More specifically, they involve participants rating how confident they are that the answers they provide for particular items are correct (Wickens, 2002). Confidence judgments can also be extended to include holistic predictions of performance, such as in the case of predicting one's overall performance on a test or performance relative to others. In addition to being objectively scored and easily administered (Tobias & Everson, 1997), confidence judgments circumvent many of the problems associated with traditional self-report methods, such as item misinterpretation and social desirability, given that the participant's task (i.e., estimating confidence in answers to items) does not involve stigmatizing self-assessments (e.g., overall competency, personal character).

There currently exists only one validated measure of metacognition that employs confidence judgments. The Knowledge Monitoring Assessment (KMA; Tobias & Everson, 1997; Tobias, Everson, & Laitusis, 1999) requires participants to estimate their knowledge of particular items much in the same way that confidence judgments require participants to predict the accuracy of their responses to items. What is unique about the KMA is that actual performance on a test can be compared with participants' predictions of their performance, giving users access to both raw cognitive ability scores as well as a "knowledge monitoring" score (Tobias et al., 1999). An index of accurate knowledge monitoring is calculated by summing the number of times participants' predictions matched performance (i.e., predicted correct/answered correct + predicted incorrect/answered incorrect). An index of inaccurate knowledge monitoring is calculated by summing the number of times participants' predictions *did not match* performance (i.e., predicted correct/answered incorrect + predicted incorrect/answered correct). Hamann coefficients (the difference between the proportion of correct and incorrect responses; Romesburg, 1984) are then computed as a measure of agreement accuracy.

Like think-aloud protocols, the KMA has been widely validated across a variety of outcomes and settings. For example, studies have shown that the KMA is highly related to scholastic aptitude (mathematical ability:  $r = .50$ ; verbal ability:  $r = .29$ ; Tobias et al., 1999), as well as prior and future college grades ( $r \approx .20$  for both; Everson & Tobias, 1998). Relationships have also been found between performance on the KMA and test anxiety, such that individuals who experience anxiety are less aware of the knowledge they possess (i.e., make less accurate predictions) than those who do not experience anxiety (Everson, Smolaka, & Tobias, 1994). Furthermore, regression analyses have shown that the KMA uniquely contributes to the variance observed in test performance, above and beyond that attributable to not only self-reported metacognitive skill but also participants' raw knowledge scores (Everson & Tobias, 1998; Tobias et al., 1999).

## **2.4 Measuring the Effects of Metacognition**

The majority of studies cited in this review have examined the effects of metacognitive skill in educational settings (Flavell, 1979; Tobias & Everson 2002; Veenman & Spaans, 2005). Notably absent from this list is research examining the applications of metacognition to cross-cultural performance and adaptation. One purpose of this research is to therefore identify the ways in which individual differences in metacognitive skill can influence performance in cross-cultural settings.

Generally speaking, there are three types of situations in which metacognitive skill plays a compensatory role in performance: situations that are (a) novel, (b) complex, or (c) unstructured (see *The Compensatory Role of Metacognition*). Mere consideration of the enormous frequency with which these situations occur makes one realize how vital metacognition is to human functioning. Indeed, of the many situations we face on a daily basis, a

large portion can be characterized as new, difficult, or unfamiliar. Situations encountered in cross-cultural settings are certainly no exception. In fact, metacognitive skill is likely to exert even greater influence in the cross-cultural domain since most cultural encounters are a blend of all three situations. For example, working or living in a different cultural environment is, for many, a novel experience. Even if time and effort are spent preparing for the journey, the sense one gets from reading a textbook pales in comparison to the feeling one experiences from setting foot in a foreign country (some refer to this feeling as ‘culture shock’; Ward, Bochner, & Furnham, 2001).

Cross-cultural situations are also extremely complex. In general, any situation involving social interaction is likely to be both difficult and intricate. Individuals must be aware of personal preferences in conversational style, while simultaneously capable of decoding and reacting to the responses of others. Adding cultural elements complicates matters further. Now, individuals must contend with a multitude of other factors, such as language barriers, cultural norms, and religious preferences, in order to navigate interactions successfully.

Finally, cross-cultural situations are often highly ambiguous and unstructured. Knowing what to say, how to say it, and who to say it to are among the most difficult tasks an individual can face in a foreign environment. Rarely are there explicit rules informing sojourners how to behave in ways that are culturally appropriate. When such rules do exist, they are often incompatible across cultures, and sometimes even within cultures themselves. Findings from recent studies support this contention by showing that greater variation in individual differences exists *within* cultures than between cultures (Klafehn et al., 2009; Morris, 2009). Thus, the likelihood of encountering situations in which prevailing cultural stereotypes are inaccurate or inapplicable is fairly high. As such, it will become increasingly difficult for individuals to rely

solely on acquired knowledge when interacting in cross-cultural environments. In turn, it will become increasingly necessary for them to recruit other psychological faculties, such as metacognition, to aid them in their attempts at cultural adaptation.

## CHAPTER 3: CONSTRUCT VALIDITY OF CULTURAL METACOGNITION

### 3.1 Introduction

As mentioned in the previous chapter, there is a substantial lack of research examining the role and effects of metacognition in cross-cultural contexts. This is in part due to the even smaller number of assessments that are available to measure culturally-contextualized metacognition, in particular. Currently, there exists only one previously validated scale that explicitly claims to measure cultural metacognition<sup>2</sup>: the Cultural Intelligence Scale (CQS; Ang, Van Dyne, Koh, & Ng, 2004).

The CQS is a 20-item self-report questionnaire that was developed out of previous work conducted by Earley and Ang (2003). The measure itself comprises four subscales, each designed to assess one of the four different facets of cultural intelligence: Metacognitive CQ, Cognitive CQ, Motivational CQ, and Behavioral CQ<sup>3</sup>. The CQS has been validated across a multitude of different contexts and culturally distinct samples. Furthermore, research examining its effects has shown that the CQS predicts a number of culturally relevant outcomes, including adjustment (Templer, Tay, & Chandrasekar, 2006), cultural judgment and decision making, and task performance (Ang et al., 2007).

At first glance, this collection of findings appears quite promising. Indeed, additional results showing that the CQS demonstrates incremental validity above and beyond that of the Big Five personality factors (Ang, Van Dyne, & Koh, 2006), cognitive ability, and emotional intelligence (Ang et al., 2007) further substantiate its claim of being a valid measure of cultural

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<sup>2</sup> For the remainder of the dissertation, ‘cultural metacognition’ will be used interchangeably with ‘culturally-contextualized metacognition’. It should be noted that the phrase ‘cultural metacognition’ does not imply domain specificity with reference to metacognitive skill, but rather the context in which metacognitive skill is said to operate.

<sup>3</sup> For more detail on the four subscales of the CQS, including subscale reliabilities and sample items, please refer to the Methods section.



competence. A closer look at the data, however, reveals some inconsistencies that may warrant a reevaluation of these conclusions. To start, despite being reported as moderate in the results of a recent confirmatory factor analysis (Van Dyne, Ang, & Koh, 2008), the correlations between the subscales of the CQS vary widely across the multiple studies in which they are computed (e.g., between four studies, the correlation between Cognitive CQ and Metacognitive CQ ranged from  $r = .23$  to  $r = .76$ ). Though Ang and colleagues contend that the subscales of the CQS are indeed measuring distinct constructs, the magnitude and range of their intercorrelations, particularly with regard to the higher values, may suggest otherwise.

A second cause for concern is the set of findings from an MTMM study examining differences in the CQS across sources. Specifically, Ang and colleagues (2008) used the rules proposed by Campbell and Fiske (1959) as the basis upon which to compare self- and peer-reported ratings on the CQS. Relying on this approach is problematic for a number of reasons. First, it does not allow one to directly model the effects of method- versus trait-based variance. Thus, when interpreting a significant correlation between two constructs, it is difficult to determine what portion of the relationship represents actual construct-level overlap and what portion represents variance among the methods. Second, there is no hard and fast rule as to what constitutes evidence in support of convergent or divergent validity between a pair of constructs. According to Campbell and Fiske (1959), convergent validity is demonstrated by strong correlations between two constructs that are measuring the same trait, whereas divergent validity is demonstrated by weak correlations between two constructs that are measuring different traits. The major concern with this criterion is that there exists no universally-accepted definition or cut-off point one could use to determine whether a correlation was “strong” or “weak”. Thus, the

conclusions drawn when using such an approach are almost entirely dependent on the subjective interpretation of the individual(s) conducting the analysis.

A potential solution to this problem is to apply a structural equation modeling (SEM) framework to the analysis of MTMM data. SEM is a methodological blending of path analysis and factor analysis that allows one to model both the causal influences of observed indicator variables onto latent, or unobserved, factors, as well as the influences of the latent factors on each other (see Millsap, 2002). These latent factors can represent traits or constructs, such as cultural metacognition or openness to experience, as well as method sources, such as the self or one's peer. Thus, the SEM method greatly improves upon the previously described approach in that trait and method factors can be simultaneously modeled and evaluated. From there, more specific conclusions regarding the construct validity of the CQS in relation to other constructs, such as the Big Five, and to particular method sources could be made.

Study 1 was therefore designed as both a replication and extension of previous research on the CQS. Specifically, the purpose of the study was to (a) replicate previous findings showing support for the construct validity of the CQS as a measure of cultural competence, and, more specifically, cultural metacognition, and (2) extend those findings through the application of a structural equation modeling framework. In particular, the relation of the CQS to the Big Five personality factors was of interest, as were the potential differences in ratings made by the self versus peers. The examination of these empirical questions was accomplished through the use of an MTMM analysis by which the discriminant validity of the CQS from the Big Five was evaluated. Based on the research previously discussed, it was hypothesized that a confirmatory, nine-factor model would provide the best fit to the data.

## 3.2 Methods

### 3.2.1 Participants and Procedure

A paired sample of 206 undergraduate students and their 206 nominated peers (412 participants total) provided self- and peer-reports of cultural competence and the Big Five personality traits<sup>4</sup>. Target respondents (60% female; mean age = 19.9; 67.5% Caucasian, 19.9% Asian, 5.8% Hispanic, 2.4% African-American, 4.4% other) were either native (N = 189) or international (N = 17) undergraduate students enrolled at the University of Illinois. Students were recruited via the university's undergraduate Psychology subject pool and participated in the study for course credit. Participants accessed the study, which consisted of a series of self-report surveys, via an online survey website hosted by Qualtrics. On the last page of the website, respondents were asked to provide the first name and contact information for an individual they felt knew them well enough to answer questions about their personality and behavior. The specific instructions participants received were as follows:

“In addition to your cultural knowledge and attitudes, we are also interested in your peers’ perceptions of you. Please provide the first name and email address of one (1) person who you believe knows you well enough to be able to comment on your personality and/or behavior. This can be a friend, roommate, family member, or any other individual over 18 years of age who you feel comfortable recommending. Keep in mind that both your and your peer's responses and contact information will be kept completely confidential.”

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<sup>4</sup> The original sample consisted of 415 undergraduate participants; however, only 206 of these participants had peers who agreed to complete surveys (response rate ~ 50%). As such, only the 206 participants who had corresponding peer data were used in the study.

These peers (60% female; 64.6% Caucasian, 15.5% Asian, 6.3% Hispanic, 2.4% African-American, 11.2% other) were then contacted through email and invited to respond to the surveys on their peers' behalves. An example of the initial contact email follows:

“Dear [PEER FIRST NAME],  
[PARTICIPANT NAME] recently participated in a [UNIVERSITY] study examining the effects of cultural knowledge on performance. As part of this study, he/she was asked to provide contact information for one individual whom he/she believed would be able to rate him/her on a variety of different psychological dimensions. You were the individual he/she nominated. We kindly ask that you complete the brief online survey provided in the link below. The survey, which should take no more than 30 minutes to complete, is hosted by a secure web server (Qualtrics.com); all of your responses will be kept completely confidential from both outside parties and the individual who nominated you.”

Of the 416 original participants, 206 had peers who consented to participate in the study. Peers were taken to an online survey, similar to the one used for the participants. Once peers accessed the website, they were instructed to provide the name and email address of the respondent who referred them (email addresses were used to double check the accuracy of participant information with what had been previously recorded). The names provided by the peers were used to personalize the instructions for each measure so that they made specific reference to the participant while the peer was completing them (e.g., “Here are a number of characteristics that may or may not describe [PARTICIPANT NAME]. Please indicate on a scale of 1 to 5 (1 = strongly disagree; 5 = strongly agree) the extent to which you agree or disagree with the following statements.”).

### 3.2.2 Measures

A self-report measure of cultural competence was given to participants followed by a self-report measure of the Big Five personality traits. The same order was followed when administering the measures to participants' nominated peers.

*Cultural competence.* Self- and peer-reported cultural competence were measured via the Cultural Intelligence Scale (CQS; Ang, et al., 2004). As mentioned in the Introduction to Study 1, the CQS is a 20-item self-report inventory composed of four distinct subscales that assess individuals' standing on each of the four facets of cultural intelligence: Metacognitive CQ (4 items), Cognitive CQ (6 items), Motivational CQ (5 items), and Behavioral CQ (5 items). The metacognitive subscale ( $\alpha_s = .76$ ;  $\alpha_p = .81$ ) asks individuals to report their degree of awareness and self-regulation in cross-cultural settings (e.g., "I check the accuracy of my cultural knowledge as I interact with people from different cultures"). The cognitive subscale ( $\alpha_s = 0.84$ ;  $\alpha_p = .87$ ) asks individuals to report their knowledge of cultural theories, systems, and beliefs (e.g., "I know the cultural values and religious beliefs of other cultures"). The motivational subscale ( $\alpha_s = .76$ ;  $\alpha_p = .87$ ) asks individuals to report how much they enjoy and how confident they feel living and interacting in cross-cultural settings (e.g., "I am sure I can deal with the stresses of adjusting to a culture that is new to me"). The behavioral subscale ( $\alpha_s = .83$ ;  $\alpha_p = .84$ ) asks participants to report how much they alter their verbal and non-verbal behavior in cross-cultural settings (e.g., "I use pause and silence differently to suit different cross-cultural situations"). For peer-reported cultural competence, items on the CQS were slightly modified to reflect peers' levels of agreement with statements describing participants' performance in other cultures (e.g., "[PARTICIPANT NAME] knows the cultural values and religious beliefs of other cultures"). Participants and peers expressed their levels of agreement with each item using a

Likert-type scale that ranges from 1 (strongly disagree) to 7 (strongly agree). Scores for each facet were obtained by summing item responses within the corresponding subscales. Scores for overall cultural intelligence were obtained by summing responses to all 20 items.

*Big Five Personality.* The Big Five personality traits (i.e., Extraversion, Agreeableness, Conscientiousness, Neuroticism, Openness; Goldberg, 1990) were measured using the Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). The BFI is a 44-item questionnaire that asks participants to indicate their level of agreement with various characteristics describing their personality (e.g. “I am someone who makes plans and follows through with them”, “I am someone who is full of energy”). For peer-reports of the Big Five, items on the BFI were slightly modified so as to reflect peers’ levels of agreement with various characteristics describing participants’ personality traits (e.g., “[PARTICIPANT NAME] is someone who makes plans and follows through with them”). Participants and peers rated their agreement along a 5-point Likert scale where 1 = strongly disagree and 5 = strongly agree.

Participants’ self- and peer-reported measures of the Big Five factors were calculated as the mean score across the constituent items corresponding to each subscale. Reliabilities for each of the self-reported subscales ranged from .71 for Openness to .87 for Extraversion. Peer-reported subscales showed equivalent levels of internal consistency, ranging from .74 for Extraversion to .81 for Agreeableness. All scale reliabilities are reported in Table 1.

### **3.3 Analyses and Results**

Descriptive statistics for and correlations between the self- and peer-reported subscales of the CQS and BFI are given in Table 1. The remaining sections detail the steps taken in analyzing the data using a multitrait-multimethod framework.

Table 1. Means, standard deviations, and correlations for self- and peer-reported CQS and BFI

	<i>MN</i>	<i>SD</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>
1. Metacognitive CQ - S	4.82	0.97	(.76)									
2. Cognitive CQ - S	3.79	1.10	0.54**	(.84)								
3. Motivational CQ - S	4.89	1.00	0.57**	0.46**	(.76)							
4. Behavioral CQ - S	4.47	1.05	0.62**	0.45**	0.46**	(.83)						
5. Metacognitive CQ - P	5.34	0.92	0.18**	0.08	0.23**	0.06	(.81)					
6. Cognitive CQ - P	4.78	1.07	0.17*	0.11	0.13	0.06	0.69**	(.87)				
7. Motivational CQ - P	5.43	1.05	0.21**	0.08	0.31**	0.11*	0.67**	0.59**	(.87)			
8. Behavioral CQ - P	4.89	1.08	0.04	-0.08	0.02	0.03	0.61**	0.47**	0.46**	(.84)		
9. Extraversion - S	3.30	0.70	0.06	-0.02	0.17*	0.02	0.11	0.03	0.24**	0.00	(.89)	
10. Agreeableness - S	3.73	0.52	0.11*	-0.06	0.20**	0.11	0.10	0.01	0.14	0.10	0.24**	(.72)
11. Conscientiousness - S	3.48	0.57	0.02	-0.02	0.04	0.02	0.02	-0.04	-0.03	0.02	0.22**	0.25**
12. Neuroticism - S	2.91	0.70	-0.03	-0.01	-0.17*	-0.01	0.15*	0.18*	0.06	0.11	-0.19**	-0.30**
13. Openness - S	3.48	0.57	0.31**	0.26**	0.27**	0.16*	0.12	0.08	0.18**	-0.04	0.21**	0.20**
14. Extraversion - P	3.49	0.65	-0.01	-0.04	0.05	0.04	0.28**	0.23**	0.34**	0.19**	0.35**	0.19**
15. Agreeableness - P	3.58	0.71	0.04	0.00	0.07	0.00	0.28**	0.29**	0.29**	0.22**	0.08	0.17*
16. Conscientiousness - P	3.58	0.66	0.12	0.05	0.13	0.08	0.23**	0.25**	0.29**	0.10	0.07	0.12
17. Neuroticism - P	2.82	0.69	0.04	0.01	-0.01	0.05	-0.15*	-0.21**	-0.22**	-0.12	-0.09	-0.05
18. Openness - P	3.71	0.61	0.11	-0.01	0.19**	-0.05	0.39**	0.32**	0.44**	0.22**	0.15*	0.09

N = 206 dyads; \*  $p < .05$ ; \*\*  $p < .01$

NOTE: (S) = self-report, (P) = peer-report

Table 1, contd. Means, standard deviations, and correlations for self- and peer-reported CQS and BFI

	<i>MN</i>	<i>SD</i>	<i>11</i>	<i>12</i>	<i>13</i>	<i>14</i>	<i>15</i>	<i>16</i>	<i>17</i>	<i>18</i>
1. Metacognitive CQ - S	4.82	0.97								
2. Cognitive CQ - S	3.79	1.10								
3. Motivational CQ - S	4.89	1.00								
4. Behavioral CQ - S	4.47	1.05								
5. Metacognitive CQ - P	5.34	0.92								
6. Cognitive CQ - P	4.78	1.07								
7. Motivational CQ - P	5.43	1.05								
8. Behavioral CQ - P	4.89	1.08								
9. Extraversion - S	3.30	0.70								
10. Agreeableness - S	3.73	0.52								
11. Conscientiousness - S	3.48	0.57	(.83)							
12. Neuroticism - S	2.91	0.70	-0.37**	(.87)						
13. Openness - S	3.48	0.57	0.12*	-0.18**	(.79)					
14. Extraversion - P	3.49	0.65	0.17*	-0.01	0.00	(.74)				
15. Agreeableness - P	3.58	0.71	0.03	0.08	0.00	0.45**	(.80)			
16. Conscientiousness - P	3.58	0.66	0.17*	-0.02	0.09	0.48**	0.69**	(.77)		
17. Neuroticism - P	2.82	0.69	-0.06	0.21**	-0.03	0.11	-0.21**	-0.09	(.75)	
18. Openness - P	3.71	0.61	0.09	0.06	0.34**	0.50**	0.44**	0.47**	0.11	(.83)

N = 206 dyads; \*  $p < .05$ ; \*\*  $p < .01$

NOTE: (S) = self-report, (P) = peer-report



Table 2. Results of Confirmatory Factor Analysis (CFA) of CQS and BFI

Observed Variables	Factor Loadings	
	Self-Report	Peer-Report
<b>CQS (Ang, et al., 200X)</b>		
Item 1 (Metacognitive CQ)	.66	.72
Item 2 (Metacognitive CQ)	.67	.62
Item 3 (Metacognitive CQ)	.66	.82
Item 4 (Metacognitive CQ)	.71	.71
Item 5 (Cognitive CQ)	.68	.66
Item 6 (Cognitive CQ)	.52	.65
Item 7 (Cognitive CQ)	.64	.77
Item 8 (Cognitive CQ)	.70	.73
Item 9 (Cognitive CQ)	.72	.72
Item 10 (Cognitive CQ)	.74	.81
Item 11 (Motivational CQ)	.65	.72
Item 12 (Motivational CQ)	.73	.78
Item 13 (Motivational CQ)	.75	.75
Item 14 (Motivational CQ)	.66	.79
Item 15 (Motivational CQ)	.62	.75
Item 16 (Behavioral CQ)	.73	.83
Item 17 (Behavioral CQ)	.72	.64
Item 18 (Behavioral CQ)	.65	.76
Item 19 (Behavioral CQ)	.74	.72
Item 20 (Behavioral CQ)	.72	.67
<b>BFI (John &amp; Sriavstrava, 1999)</b>		
Parcel 1 (Extraversion Items 16, 26)	.70	.54
Parcel 2 (Extraversion Items 6, 36)	.82	.80
Parcel 3 (Extraversion Items 11, 21)	.87	.82
Parcel 4 (Extraversion Items 1, 31)	.88	.78
Parcel 5 (Agreeableness Items 12, 22,27)	.70	.42
Parcel 6 (Agreeableness Items 2,37)	.59	.23
Parcel 7 (Agreeableness Items 7, 42)	.58	.87
Parcel 8 (Agreeableness Items 17,32)	.68	.87
Parcel 9 (Conscientiousness Items 13, 18, 38)	.79	.85
Parcel 10 (Conscientiousness Items 8, 28)	.75	.83
Parcel 11 (Conscientiousness Items 33, 43)	.67	.69
Parcel 12 (Conscientiousness Items 3, 23)	.87	.83
Parcel 13 (Neuroticism Items 4, 34)	.83	.72
Parcel 14 (Neuroticism Items 19, 29)	.76	.50
Parcel 15 (Neuroticism Items 9, 39)	.85	.87
Parcel 16 (Neuroticism Items 14, 24)	.82	.81
Parcel 17 (Openness Items 20, 30)	.78	.85
Parcel 18 (Openness Items 10, 25)	.66	.77
Parcel 19 (Openness Items 40, 44)	.81	.80
Parcel 20 (Openness Items 5, 41)	.59	.63
Parcel 21 (Openness Items 15, 35)	.48	.45
<b>Fit Indices</b>		
$\chi^2$ (df)	1197.06 (743)	1496.31 (743)
RMSEA (90% CI)/SRMR	.054 (.049-.060)/.070	.070 (.065-.075)/.079
TLI/CFI	.94/.95	.94/.94

### 3.3.1 Confirmatory Factor Analysis

Before beginning the MTMM analyses, it was necessary to first confirm the a priori nine-factor structural model, which comprised five factors representing the five subscales of the BFI and four factors representing the four subscales of the CQS. It should be noted that the BFI was analyzed at the item-parcel level rather than at the item level. This decision was made primarily due to previous research suggesting that five-factor personality measures produce poor fit when factor analyzed at the item level (Lim & Ployhart, 2006). Thus, each subscale of the BFI was divided into four parcels (with the exception of Openness which was divided into five parcels due to there being a larger number of items for that subscale), with two to three items randomly assigned to each parcel. Specific item-parcel assignments are given in the latter half of Table 2.

*Results.* Two sets of confirmatory factor models, one for the self-report data and one for the peer-report data, were estimated using LISREL 8.51 (Joreskog & Sorbom, 1996). The results of this analysis are presented in Table 2. Factor loadings for the self- and peer-report data were similar for both the CQS and BFI, and largely confirmed the hypothesized nine-factor model. The standardized factor loadings were mostly moderate to high (average loading for self-report = .71; average loading for peer-report = .72). Overall fit of the CQS and BFI measurement models was judged to be acceptable. For the self-report data, root mean square error of approximation [RMSEA] = .054; Tucker-Lewis Index [TLI] = .94; comparative fit index [CFI] = .95; standardized root mean squared residual [SRMR] = .070; and for the peer-report data, RMSEA = .070; TLI = .94; CFI = .94; SRMR = .079.

### 3.3.2 Measurement Equivalence

*Analysis.* Having confirmed the nine-factor structure for both the self-report and peer-report data in the previous section, the next step was to determine whether the same constructs

were being measured across the different measurement sources, also known as measurement equivalence. In other words, were participants and their peers responding similarly to the same items on the CQS and BFI? To establish measurement equivalence, a series of models was used (see Vandenberg & Lance, 2000) to compare the CFA solution for the self-report data to the CFA solution for the peer-report data. The series comprised seven models in total, with each subsequent model nested within the previous and progressively more constrained. Model 1, the least constrained model, was designed to establish configural invariance, the null hypothesis being that the patterns of factor loadings from the self-report and peer-report data were not significantly different from one another. Model 2, which was nested within Model 1, was used to establish metric invariance; here, the null hypothesis stated that the magnitudes of the factor loadings from the self-report and peer-report data were equivalent (i.e., constrained equal). Model 3 was used to establish scalar invariance; the null hypothesis stating that the item-level intercepts across measurement sources were equivalent (i.e., constrained equal). Models 4 through 7 were used to specify increasingly constrained levels of metric invariance: invariant item uniquenesses, latent factor variances, latent factor covariances, and latent factor means, respectively.

*Results.* The results of the comparisons between each adjacent pair of nested models are given in Table 3. Using the recommendation given by Cheung and Rensvold (2002), invariance between models is operationalized as a change in CFI less than or equal to -.01. In other words, the null hypothesis of invariance would hold (i.e., not be rejected) for each pair of adjacent models whose CFI estimates differed slightly to not at all from one another. This criterion was chosen over the  $\chi^2$  difference test, given that CFI estimates are less sensitive to sample size, and are thus less likely to improperly signal statistical significance (Fan, Thompson, & Wang, 1999).

Table 3. Measurement equivalence for CQS and BFI across sources (self-report vs. peer-report)

<i>Measurement Equivalence Model</i>	$\chi^2$	<i>df</i>	RMSEA (90% CI)	TLI (NNFI)	CFI	SRMR	$\Delta$ CFI
<b>CQS only</b>							
1. Configural invariance	958.38	712	.041 (.034-.048)	.970	.9727	.059	—
2. Metric invariance	971.48	728	.040 (.033-.047)	.971	.9729	.060	.000
3. Scalar invariance	1100.86	744	.048 (.042-.054)	.961	.9627	.065	-.010
4. Invariant uniquenesses	1149.58	764	.050 (.044-.056)	.961	.9613	.067	-.001
5. Invariant factor variances	1152.88	768	.050 (.044-.055)	.961	.9616	.068	.000
6. Invariant factor covariances	1165.91	774	.050 (.044-.056)	.961	.9611	.071	-.000
7. Invariant factor means	1301.14	778	.057 (.052-.063)	.949	.9495	.072	-.012
<b>BFI only</b>							
1. Configural invariance	1594.13	774	.072 (.067-.077)	.895	.9055	.083	—
2. Metric invariance	1708.43	790	.075 (.070-.080)	.894	.9029	.080	-.003
3. Scalar invariance	2441.53	806	.100 (.095-.104)	.823	.8340	.085	-.069
4. Invariant uniquenesses	2137.25	827	.088 (.083-.093)	.840	.8460	.112	.012
5. Invariant factor variances	2148.34	832	.088 (.083-.092)	.840	.7453	.112	-.101
6. Invariant factor covariances	2665.50	842	.103 (.098-.107)	.816	.7297	.107	-.016
7. Invariant factor means	2808.73	847	.106 (.102-.110)	.810	.7276	.113	-.002
<b>CQS and BFI combined</b>							
1. Configural invariance	4463.72	3086	.047 (.044-.050)	.920	.9259	.068	—
2. Metric invariance	4584.33	3118	.048 (.045-.051)	.920	.9250	.067	-.001
3. Scalar invariance	5144.25	3150	.056 (.053-.058)	.896	.9011	.084	-.024
4. Invariant uniquenesses	5256.06	3191	.056 (.053-.059)	.895	.8989	.084	-.002
5. Invariant factor variances	5277.07	3200	.056 (.054-.059)	.895	.8991	.085	.000
6. Invariant factor covariances	5832.64	3216	.063 (.060-.066)	.886	.8893	.082	-.010
7. Invariant factor means	6225.61	3225	.067 (.065-.070)	.879	.8829	.094	-.006

Table 4. Item-level intercepts for self- and peer-reported BFI

Observed Variables	Intercepts	
	Self-Report	Peer-Report
<b>BFI (John &amp; Sriavstrava, 1999)</b>		
Parcel 1 (Extraversion Items 16, 26)	--	--
Parcel 2 (Extraversion Items 6, 36)	-2.28	-2.54
Parcel 3 (Extraversion Items 11, 21)	-2.50	-2.92
Parcel 4 (Extraversion Items 1, 31)	-3.05	-3.03
Parcel 5 (Agreeableness Items 12, 22,27)	--	--
Parcel 6 (Agreeableness Items 2,37)	-2.05	-1.27
Parcel 7 (Agreeableness Items 7, 42)	-7.05	-4.53
Parcel 8 (Agreeableness Items 17,32)	-7.71	-5.15
Parcel 9 (Conscientiousness Items 13, 18, 38)	--	--
Parcel 10 (Conscientiousness Items 8, 28)	-4.50	-4.01
Parcel 11 (Conscientiousness Items 33, 43)	-3.06	-2.38
Parcel 12 (Conscientiousness Items 3, 23)	-4.79	-4.52
Parcel 13 (Neuroticism Items 4, 34)	--	--
Parcel 14 (Neuroticism Items 19, 29)	2.75	1.72
Parcel 15 (Neuroticism Items 9, 39)	0.91	0.37
Parcel 16 (Neuroticism Items 14, 24)	1.08	1.04
Parcel 17 (Openness Items 20, 30)	--	--
Parcel 18 (Openness Items 10, 25)	1.04	1.09
Parcel 19 (Openness Items 40, 44)	-0.43	-0.34
Parcel 20 (Openness Items 5, 41)	1.20	1.38
Parcel 21 (Openness Items 15, 35)	2.14	2.47
<i>Average Intercept</i>	-1.77	-1.41

NOTE: The first parcel of each subscale was fixed to 0.0 to standardize the metric

Looking at the results presented at bottom of Table 3, one can see that measurement equivalence holds for the first two models (Model 1, which specifies configural invariance, and Model 2, which specifies metric invariance). Model 3, however, violates the  $\Delta CFI$  heuristic proposed by Cheung and Rensvold. This suggests that measurement equivalence does not hold at the scalar level, or rather, that item-level intercepts are different across the two measurement sources. Given that the aforementioned analyses were conducted on the CQS and BFI together, it was of interest to determine whether the misfit evidenced in Model 3 originated from a specific source. As such, two post-hoc analyses were conducted to examine the measurement equivalence of the CQS and BFI independently. The results of these follow-up analyses are also given in Table 3.

From the results, it is clear that the CQS exhibits fairly good measurement equivalence. All models, with the exception of Model 7, passed the  $\Delta CFI$  criterion (all  $\Delta CFI \leq -.01$ ). Model 7, the most highly constrained of all models tested, only slightly exceeded the CFI cutoff value by .002. Despite this overage, the fit of Model 7 was still deemed acceptable ( $RMSEA = .057$ ;  $TLI = .949$ ;  $CFI = .950$ ;  $SRMR = .072$ ), as it met the more stringent criteria proposed by Hu and Bentler (1999) for  $RMSEA (< .06)$ ,  $SRMR (< .08)$ , and  $CFI (.95)$ , and approached the cutoff value for  $TLI (.95)$ . Thus, it is plausible to conclude that self-reported CQ exhibits moderate to high levels of measurement equivalence with peer-reported CQ, and that the misfit in the composite analyses was most likely not due to nonequivalence of the CQS across rating sources.

The fit of the BFI, on the other hand, was quite poor. Like the fit of the models tested in the composite analyses, the BFI demonstrated measurement equivalence for only the first two models in the series (Model 1 and Model 2). For Model 3, the  $\Delta CFI$  was equal to  $-.069$ , which was far greater than the proposed cutoff value of  $-.01$ . Thus, the hypothesis that item-level

intercepts were equivalent across measurement sources (i.e., scalar invariance) was rejected for the BFI. In specific, peer ratings tended to be more lenient than self-ratings of Big Five personality (see Table 4). Furthermore, it is likely that the misfit found for the combined analyses (CQS and BFI together) was due to nonequivalence in the BFI mean structure between self- and peer-reports. On the other hand, because the self- and peer-reports of personality and cultural competence exhibited measurement equivalence with regard to the covariance structure and factor loadings, I decided to proceed with the multitrait-multimethod (MTMM) analyses of the CQS and BFI, given that these MTMM analyses would be based upon the item covariances (which were equivalent across rating sources) and not based upon the item means (which were nonequivalent across groups).

### *3.3.3. Multitrait-Multimethod Analysis*

*Analysis.* The third and final step was to assess the construct validity of CQ and the Big Five personality factors. To do so, a multitrait-multimethod (MTMM) analysis technique was utilized within the structural equation modeling framework. MTMM is useful in that it helps assess both convergent validity (e.g., the extent to which concepts that should be related are related) and divergent validity (e.g., the extent to which concepts that are different from one another are not related; Campbell & Fiske, 1959). Practically speaking, convergent validity is demonstrated when the same concepts (or traits) measured by different methods are highly correlated with one another. Divergent validity, on the other hand, is demonstrated when different concepts (or traits) are less-than-perfectly related to one another. In the present study, the four subscales of the CQS and five subscales of the BFI comprised the traits, whereas the two data sources (i.e., self-report vs. peer-report) comprised the methods. Thus, convergent validity

was sought independently for the CQS and BFI across sources, whereas divergent validity was sought between the CQS and BFI subscales themselves.

Following the MTMM procedure stipulated by Widaman (1985), a sequence of eight nested CFA models was tested. For illustrative purposes, each of the eight models should be considered a variation of the model presented in Figure 1. In this model, the center column comprises eighteen boxes (i.e., indicators), each of which represents observed scores from the self-report and peer-report subscales of the CQS (4 subscales) and BFI (5 subscales). Each indicator is allowed to double-load, once onto its corresponding latent trait factor and once onto its corresponding latent method factor. For example, the measure of self-reported Metacognitive CQ loads once onto the Metacognitive CQ trait factor, and once onto the self-report method factor. The model as depicted in Figure 1 specifies that the latent method factor intercorrelations be fixed to 0 (i.e., methods are uncorrelated), whereas the latent trait factor intercorrelations are freely estimated (i.e., traits are allowed to correlate with one another). Other variations on this model included (a) fixing the trait loadings to zero (no trait factors), (b) fixing the method loadings to zero (no method factors), (c) freeing the intercorrelations between method factors (correlated method factors), (d) fixing all CQ trait factor intercorrelations to 1.0 (one general CQ trait), and (e) fixing all trait (CQ and Big Five) factor intercorrelations to 1.0 (one general trait). A summary of these models is given in Table 5.

The model predicted to provide the best fit to the data was the model depicted in Figure 1 (see also Model 3 in Table 5). Specifically, it was hypothesized that (1) the four subscales of the CQS and five subscales of the BFI would load onto nine separate, but interrelated, latent trait factors, and that (2) the self-reports and peer-reports of the same construct would load onto two separate latent method factors. In other words, the purpose of the first hypothesis was to test for



evidence of divergent validity between the measures, whereas the purpose of the second hypothesis was to test for evidence of convergent validity within the measures. The tests for both divergent and convergent validity necessitate comparisons between models that differ with respect to the loadings of individual measures onto their corresponding latent trait and method factors. Evidence of divergent validity, for example, is demonstrated by comparing the fit of models which specify latent traits as individual factors to that of models which specify latent traits as one general factor (e.g., personality). Evidence of convergent validity, on the other hand, is demonstrated by comparing the fit of models which allow measures from different methods to load onto their corresponding latent trait factors (e.g., self-reported and peer-reported Metacognitive CQ are allowed to load onto the Metacognitive CQ trait factor) versus models which do not allow such loadings.

*Results.* The results of the MTMM analyses are given in Table 5. In support of the two aforementioned hypotheses, Model 3 (nine separate but correlated trait factors and two uncorrelated method factors) provided the best fit to the data (RMSEA = .072; TLI = .896; CFI = .944; SRMR = .059). Model 4, which was identical to Model 3 with the exception that the method factors were correlated, displayed equally good fit (RMSEA = .072; TLI = .894; CFI = .944; SRMR = .060; correlation between methods,  $\phi = .03$ ). Model 3, however, was ultimately chosen because its solution was more parsimonious. Regardless, the results from both models indicate that the four subscales of the CQS and five subscales of the BFI, though interrelated, should indeed be conceptualized as distinct from one another. Additional support for this was found in the correlations between the nine latent factors (see Table 6). Specifically, all intercorrelations among the subscales of the CQS and BFI were small to moderate in size (range: -.04 – .47). Of those correlations that were larger, the majority existed among those factors that

have been previously identified as important to the development and measurement of cultural competence (i.e., Openness to Experience; average  $\phi = .32$ ; Ang, Van Dyne, & Koh, 2006).

To further test for divergent validity, comparisons were also made between Model 2 (separate latent factors) and Model 7 (one general latent factor), as well as between Model 3 and Model 8 (one general CQ factor, uncorrelated methods) and between Model 3 and Model 9 (one general CQ factor, correlated methods). The former test was conducted to determine whether cultural competence should be conceptualized as distinct from the Big Five personality factors, whereas the latter tests were conducted to determine whether cultural competence should be conceptualized as four individual factors, as per the four subscales of the CQS, or as one global CQ factor. Results from the first comparison show that Model 2 (RMSEA = 0.168; TLI = .575; CFI = .722; SRMR = .131) fit the data better than Model 7 (RMSEA = 0.241; TLI = .223; CFI = .313; SRMR = .220). Thus, evidence for divergent validity between cultural competence and the Big Five factors was found, suggesting that cultural competence should be thought of as a construct separate from that of personality.

Results from the second set of comparisons (i.e., between Model 3 and Model 8, and between Model 3 and Model 9) were similar; specifically, Model 3 fit the data better than either Model 8 (RMSEA = 0.094; TLI = .810; CFI = .870; SRMR = .096) or Model 9 (RMSEA = 0.095; TLI = .816; CFI = .875; SRMR = .103). In this case, divergent validity among the CQS subscales was supported. This suggests that cultural competence, at least as measured by the CQS, is most appropriately construed as four distinct but related factors, rather than one global construct.

Despite these findings, however, it should be noted that some of the correlations between the subscales of the CQS were quite large. Of particular concern were the latent correlations

Table 5. Multitrait-multimethod results for CQS and BFI

<i>MTMM Model</i>	<i>Trait Factors</i>	<i>Method Factors</i>	$\chi^2$	<i>df</i>	<i>RMSEA (90% CI)</i>	<i>TLI (NNFI)</i>	<i>CFI</i>	<i>SRMR</i>
1. <i>Model I</i>	None	None	1837.84	153	.232 (.222-.241)	.261	.2609	.229
2. <i>Model II</i>	Correlated	None	675.34	100	.168 (.156-.180)	.575	.7222	.131
3. <i>Model III*</i>	Correlated	Uncorrelated	168.72	82	.072 (.056-.087)	.896	.9441	.059
4. <i>Model IV</i>	Correlated	Correlated	167.77	81	.072 (.057-.088)	.894	.9439	.060
5. <i>Model V</i>	None	Uncorrelated	931.70	136	.169 (.159-.179)	.540	.5906	.153
6. <i>Model VI</i>	None	Correlated	928.68	135	.169 (.159-.180)	.538	.5922	.156
7. <i>Model VII</i>	1 General	None	1749.27	136	.241 (.231-.251)	.223	.3132	.220
8. <i>Model VIII</i>	1 Gen CQ	Uncorrelated	296.97	105	.094 (.082-.107)	.810	.8698	.096
9. <i>Model IX</i>	1 Gen CQ	Correlated	295.03	104	.095 (.082-.108)	.816	.8748	.103

Note: \* = Best-fitting model. For Model VII, “1 General” refers to one general latent trait factor. For Models VIII and IX, “1 Gen CQ” refers to one general CQ factor (as opposed to four distinct CQ factors).

Figure 1. MTMM Model 3 for CQ and Big Five personality

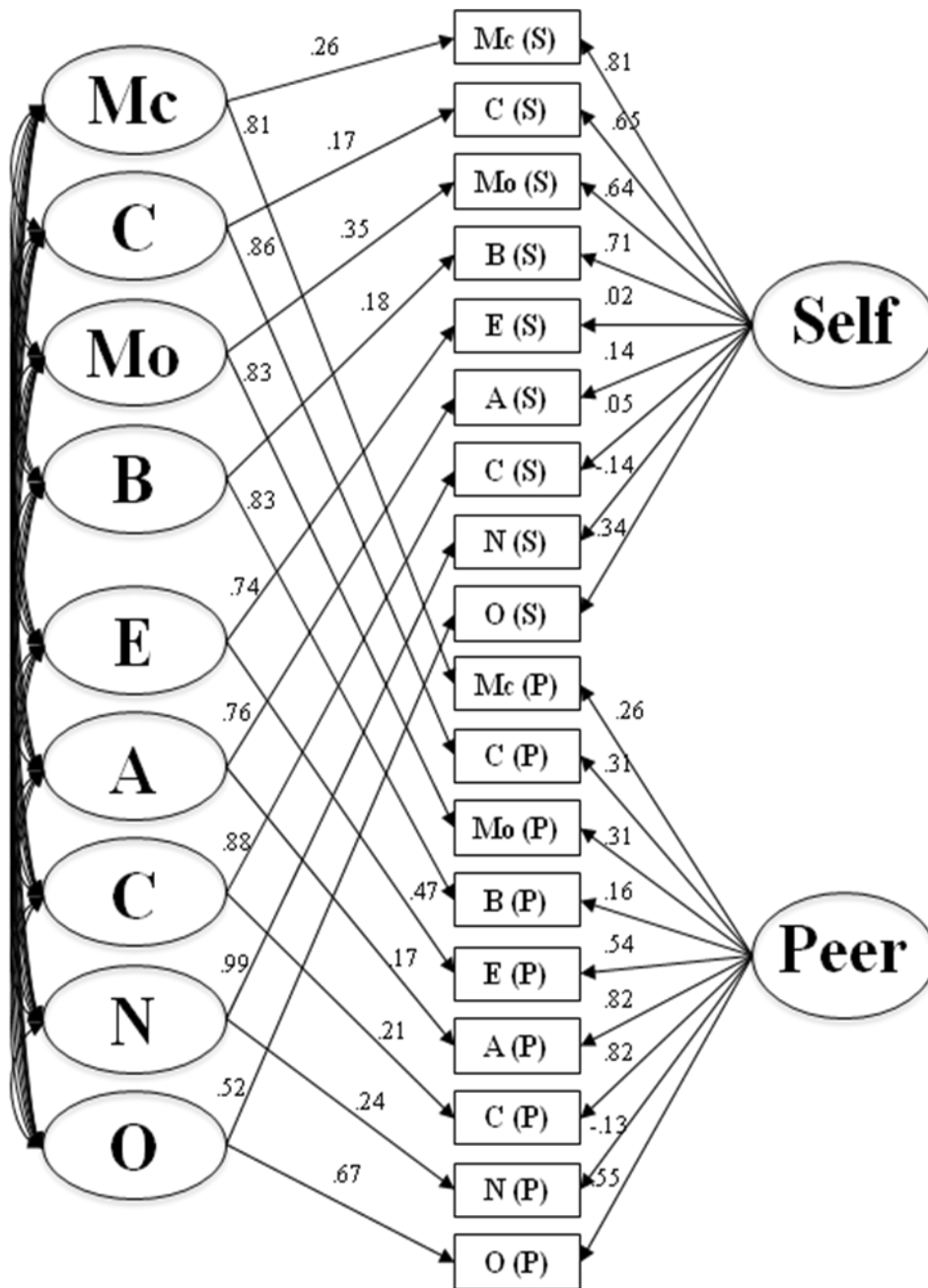


Table 6. Phi matrix (latent correlations) of CQS and BFI subscales

Variable	1	2	3	4	5	6	7	8	9
<b>CQS</b>									
1. Metacognitive CQ	1.00								
2. Cognitive CQ	0.86 <sup>a</sup>	1.00							
3. Motivational CQ	0.86 <sup>a</sup>	0.67	1.00						
4. Behavioral CQ	0.83 <sup>a</sup>	0.58	0.57	1.00					
<b>BFI</b>									
5. Extraversion	0.21	0.07	0.42	0.06	1.00				
6. Agreeableness	0.16	0.00	0.21	0.20	0.44	1.00			
7. Conscientiousness	0.02	-0.04	0.00	0.02	0.43	0.30	1.00		
8. Neuroticism	0.14	0.15	0.01	0.10	-0.22	-0.29	-0.48	1.00	
9. Openness	0.41	0.23	0.47	0.16	0.39	0.14	0.22	-0.09	1.00
<i>Square root of average variance extracted<sup>b</sup></i>	.82	.77	.82	.76	.78	.74	.84	.79	.79

N = 206; Completely standardized estimates based on MTMM Model 3

a. Fails Fornell and Larcker (1981) test of discriminant validity

b. When latent correlation is greater than square root of average variance extracted, discriminant validity is questionable

between Metacognitive CQ and the other three subscales of the CQS (Cognitive CQ,  $\phi = .86$ ; Motivational CQ,  $\phi = .86$ ; Behavioral CQ,  $\phi = .83$ ). The sizes of these correlations, though passing the formal test of discriminant validity,  $\phi \neq 1.0$  (Widaman, 1985), call into question the uniqueness of the Metacognitive CQ subscale as a standalone subfacet of cultural competence. As such, the Fornell and Larcker's (1981) test was applied as an additional (and less conservative) test of discriminant validity among the CQS subscales. The Fornell and Larcker test specifies that latent factors are divergent if their correlation is less than the square root of the average indicator variance extracted by each factor:

$$\sqrt{\frac{\sum_{i=1}^J \lambda_{xi}^2}{\sum_{i=1}^J \lambda_{xi}^2 + \sum_{i=1}^J Var(\delta_i)}}$$

where  $\sum_{i=1}^J \lambda_{xi}^2$  is the sum of the squared factor loadings across all  $J$  indicators, and  $\sum_{i=1}^J Var(\delta_i)$  is the sum of the indicator error variances. Based on the values computed from this test, three latent correlations were identified as having questionable discriminant validity: Metacognitive CQ-Cognitive CQ ( $\phi = .86$ ), Metacognitive CQ-Motivational CQ ( $\phi = .86$ ), Metacognitive CQ-Behavioral CQ ( $\phi = .83$ ). Thus, in each of these cases, the correlation between the pair of latent factors exceeded the square root of the average error variance extracted by its constituent factors.

A final result that bears mentioning is the unique pattern of factor loadings that emerged from the best fitting model, Model 3. Specifically, the four latent CQS factors were found to have high trait loadings for peer-report measures, but low trait loadings for self-report measures. This pattern was reversed for the five latent BFI factors, such that high trait loadings were found only for self-report measures, but not for peer-report measures. More detailed interpretations of these findings will be given in the Discussion section.

### 3.4 Discussion

The purpose of Study 1 was to both complement and extend previous research on the construct validity of a measure of cultural metacognition, and more generally, cultural competence, with a particular focus on its relation to the Big Five personality factors. There were several findings that merit discussion. To begin, the results from the CFA supported a hypothesized nine-factor model which differentiated the four subscales of the CQS from the five subscales of the BFI. This nine-factor model, which was based off of self-report data, was replicated with peer-report data, as well.

Next, both discriminant and convergent validity of the CQS and BFI were assessed using multitrait-multimethod (MTMM) analyses. Results from the MTMM analysis provided evidence in support of discriminant validity between cultural competence and the Big Five. Specifically, the CQS and BFI, though intercorrelated, were found to be empirically distinct from one another, as in accordance with the nine-factor model which best fit the data (i.e., Model 3). This corroborates previous research which has demonstrated similar divergence between the CQS and measures of the Big Five personality traits (Ang et al., 2006).

Also in line with previous research were the findings in support of discriminant validity between the subscales of the CQS. In the study mentioned above, Ang and colleagues (2006) found divergence not only between the CQS and the Big Five, but also among the four subscales of the CQS. From these results, Ang, et al., suggested that each subscale should be conceptualized as unique and reflective of a different aspect of cultural competence. This divergence among the subscales was replicated in the present study. Specifically, Models 8 and 9, which constrained the items on the CQS to load onto a single “cultural competence” factor, fit the data worse than similar models which did not impose such constraints (i.e., Model 3).

Based on these results, cultural competence should be conceptualized as a multifaceted construct comprised of unique, interrelated factors that are distinguishable from the Big Five personality traits. The next set of findings, however, suggests that such a conclusion may warrant a reevaluation. For instance, it was found that Metacognitive CQ shared over 50% of its variance with the other three subscales of the CQS (i.e., Cognitive CQ, Motivational CQ, and Behavioral CQ). The reason for this overlap is likely due to the strong content-based similarity between the items of the CQS. For example, consider the following item: “I adjust my cultural knowledge as I interact with people from a culture that is unfamiliar to me”. Despite belonging to the Metacognitive CQ subscale, this item also contains elements that reference aspects of the Cognitive CQ subscale (“cultural knowledge”) as well as the Behavioral CQ subscale (“I adjust” and “I interact”). As such, it appears that the Metacognitive CQ subscale is operationalizing metacognition in one of two ways. The first way implies that the subscale represents nothing more than the theoretical aggregate of the other three subscales; this calls into question not only the role of Metacognitive CQ as a subfacet of the CQS, but also the existence of cultural metacognition as a construct. The second way implies that the subscale does indeed represent something greater than the sum of its parts, but that this “something” happens to be highly related to the other subfacets of cultural competence (and thus more difficult to represent in item form!).

Which, then, is the more appropriate operationalization of Metacognitive CQ? Based on the Widaman (1985) test of discriminant validity, each of the latent factor correlations between the subscales was less than 1.0, suggesting that Metacognitive CQ is not the same thing as Cognitive CQ, Motivational CQ, or Behavioral CQ. On the other hand, each of these correlations failed the less conservative Fornell and Larcker (1981) test, suggesting a large amount of overlap



between Metacognitive CQ and the other three subscales. In response to these opposing findings, it is suggested that divergent validity be thought of as existing along a continuum, from weak discriminant validity to strong discriminant validity (Joseph & Newman, 2010). Using this framework as a guide, one is able to conclude that Metacognitive CQ exhibits weak divergent validity evidence. In other words, Metacognitive CQ, despite being highly correlated with the other CQS subscales, should be tentatively accepted as a unique component of cultural competence.

Another set of findings that warrant discussion are those pertaining to the establishment of partial measurement equivalence. Specifically, the self-reported nine-factor model was found to share equivalent patterns and values of factor loadings with the peer-reported nine-factor model. The more constrained models (i.e., those specifying scalar invariance, invariant factor uniquenesses, covariances, variances, and means), however, were not equivalent across sources. To further investigate this nonequivalence, post-hoc analyses were conducted on the CQS and BFI independently. From these analyses, it was deduced that the BFI item intercepts were the primary source of nonequivalence found in the nine-factor model, as the CQS demonstrated fairly strict invariance for nearly all levels of constraints that were tested.

These findings suggest that personality may be measured and/or conceptualized differently across different sources. In other words, individuals who are making ratings about their own personalities are referencing different constructs than individuals who are making ratings about others' personalities. This finding is in line with previous research which has shown that differences exist in the ways self- and peer-report measures assess personality traits (Hogan, 1991; Funder, 1980; Funder & Colvin, 1988). For example, Hogan (1991) suggested that self-reports are more reflective of the internal aspects of personality; thus, the cognitive

structures and processes on which individuals rely when interpreting their social environment serve as the basis for judging their own personality traits. Peer-reports, on the other hand, are more reflective of the external aspects of personality; in this sense, the behavioral manifestations and outcomes of others' internal processes serve as the reference for judging others' personality traits. Studies conducted by Funder and colleagues have found support for this contention in that peer-reports tend to have as good or greater predictive validity than self-reports when assessing an individual's personality via overt behavioral indicators (Kolar, Funder, & Colvin, 1998). Based on this collection of findings, it is highly plausible that the BFI suffers from measurement nonequivalence due to source differences in the perception of participants' personality traits.

A separate, but related, finding was that the patterns of factor loadings coinciding with Model 3 were different across the two measurement sources. To reiterate, trait loadings on the CQS were high for peer-report measures but low for self-report measures, whereas the reverse was true for trait loadings on the BFI. In other words, it appeared that peer-reports, and by association, peers themselves, were better at assessing cultural competence than self-reports; likewise, self-report measures appeared to be better at assessing the Big Five personality traits than were peer-report measures. The assumption that individuals are better assessors of their own personality traits is in accordance with the findings that were previously discussed, particularly given the fact that the BFI is a self-report measure of personality. It is therefore quite likely that individuals would be better judges of their own personality traits when the items assessing those traits tap into characteristics that are less observable (i.e., "has an active imagination, "worries a lot").

On the other hand, judgments of constructs such as cultural competence are, by definition, dependent on behaviors that are related to one's interactions with other people. For

instance, someone who is able to communicate effectively with individuals from another culture is perceived by others to be more culturally competent than someone who is less able to do so. In other words, in order for someone to be deemed “culturally competent”, he or she must be seen by others as culturally competent, or, at the very least, exhibiting culturally competent behaviors. Peers may therefore be better assessors of cultural competence because, as previously mentioned, they are more adept at making judgments of others’ characteristics when those characteristics are directly observable. Given that many of the items on the CQS either directly or indirectly refer to some kind of behavior (e.g., “I am confident that I can socialize with locals in a culture that is unfamiliar to me.”), there is reason to believe that peers, many of whom have had first-hand experience observing the target individual in different cultures, may provide more accurate assessments of that individual’s level of cultural competence.

Peers may also be more capable judges of others’ cultural competence because they are less likely to be biased in the ratings they provide. For instance, when individuals are asked to rate their own standing on an ability-based construct, such as cultural competence, they have a tendency to overestimate their actual ability level. Similar results have been found for self-ratings of intelligence (Hansford & Hattie, 1982) and job performance (Stajkovic & Luthans, 1998). One of the primary reasons why this phenomenon likely occurs is due to individuals’ natural inclination to protect themselves against threats to their self-esteem or self-worth (Krueger, 1999; Swann, Griffin, Predmore, & Gaines, 1987). To elaborate, if an individual were to negatively endorse the item, “I enjoy interacting with people from different cultures”, he or she would have to admit to being a close-minded person and perhaps even intolerant of cultural differences. Thus, individuals are more likely to deceive themselves into thinking that they are culturally competent so that their self-worth remains intact. Given that peers’ own self-worth is

not endangered by such threats, the ratings they provide may offer a truer glimpse into the actual levels of cultural competence exhibited by others.

Together, these findings bring to light several issues concerning the use of the CQS as a measure of cultural competence, and, more specifically, cultural metacognition. First, it is unclear whether the items comprising the Metacognitive CQ subfacet actually measure something unique and meaningful. The large overlap that was found between the Metacognitive CQ subfacet and the Cognitive, Motivational, and Behavioral CQ subfacets suggests that Metacognitive CQ does not provide incremental validity above and beyond that of the other subfacets. A second concern is that peers seem to be more accurate raters of cultural competence, as measured by the CQS, than participants themselves. Given that the CQS was designed to be administered as a self-report measure, such a finding is problematic in that it calls into question the accuracy, and therefore the validity, of the ratings participants provide. As such, it is debatable whether the CQS, as well as other measures that rely primarily on self-report, is an appropriate tool by which to measure metacognition. Following the recommendations of other researchers, who have suggested that alternative means of assessing cultural competence be explored (Gelfand, Imai, & Fehr, 2008; Ward & Fischer, 2008), I attempted to create a performance-based measure of culturally-contextualized metacognition in Study 2 that would alleviate some, if not all, of these concerns. The following chapter details the methodological development and validation of this measure, as well as its potential applications and role in future research.

## CHAPTER 4: METACOGNITION AND CROSS-CULTURAL PERFORMANCE

### 4.1 Introduction

As previously mentioned, the findings from Study 1 are suggestive of potential problems inherent to the use of the CQS as a self-report measure of cultural metacognition. In general, the use of self-report measures to assess psychological constructs related to one's skill, competency, or intelligence in a particular domain can be both a dangerous and misleading endeavor (Dunning, Heath, & Suls, 2004; Kruger & Dunning, 1999; Spector, 1994). Studies have consistently shown that self-assessments of knowledge and skill correlate very weakly, or not at all, with actual performance-based measures of knowledge and skill (Dunning et al., 2004; Ehrlinger, Johnson, Banner, Dunning, & Kruger, 2008). In other words, the convergent validities for measures that are purporting to assess the same construct are much lower than would be normally expected<sup>5</sup>. This finding has been demonstrated for a number of different assessments, including self-ratings of intelligence ( $r = .21$ ; Hansford & Hattie, 1982), academic skill ( $r = .35$ ; Chemers, Hu, & Garcia, 2001), job performance ( $r = .20$ ; Stajkovic & Luthans, 1998), and medical knowledge ( $r \approx 0$ ; Eva, Cunningham, Reiter, Keane, & Norma, 2004;  $r \approx .20$ ; Tracey, Arroll, Richmond, & Barham, 1997). One of the main reasons why self-assessments tend to be inaccurate is that individuals, particularly those located in the tails of a distribution, consistently over- or underestimate their performance relative to others (Ehrlinger, et al., 2008; Kruger & Dunning, 1999). Miscalibration largely occurs because individuals (a) lack adequate information to make informed assessments, and/or (b) neglect the relevant information they already have in hand (Dunning, et al., 2004). For example, it has been suggested that underestimation is a result of individuals using their own performance as a gauge for the performance of their peers, a

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<sup>5</sup> To put this in perspective, the convergent validity between the Weschler Adult Intelligence Scale (WAIS) and the Wonderlic, two performance-based measures of cognitive ability, is equal to .92.

phenomenon known as the *false consensus effect* (Kruger & Dunning, 1999). Overestimation, on the other hand, may serve a protective function for individuals' image and self-esteem; by endorsing unrealistically optimistic views of themselves and their performance, individuals are led to feel "above average" or "superior" to their peers (Alicke, 1985), even if the opposite is shown to be true.

Perhaps the most striking finding in the self-assessment literature is that the individuals who are least competent tend to make the grossest overestimations (Kruger & Dunning, 1999; Newman & Lyon, 2009). This is troubling for two reasons. First, poor performers who overestimate their abilities tend to remain unaware of their incompetence, and are thus unlikely to change or improve upon it. This creates obvious problems for the overconfident individual if performance is in some way related to career or academic success. In cross-cultural settings, believing that one is culturally competent when one is not can unnecessarily heighten stress while subsequently lowering the predictability of successful adaptation. Second, erroneous performance estimation muddies the conclusions one can draw regarding an individual's true standing relative to others. Kruger and Dunning (1999) found that on a test of logical reasoning, participants scoring in the 12<sup>th</sup> percentile estimated their performance to fall in the 62<sup>nd</sup> percentile. Likewise, participants scoring in the 86<sup>th</sup> percentile actually *underestimated* their performance, believing it to fall in the 68<sup>th</sup> percentile. Now, imagine an employer needed to select employees from a pool of potential candidates to fill positions in his or her organization. If the employer were to base his or her decision solely on individuals' self-assessments, he or she would end up hiring not only the most competent individuals, but also the *least* competent individuals. Similar connections can be made to the selection of culturally competent employees. If employers selected individuals for international positions on the basis of their responses to

self-report measures, such as the CQS, organizations could potentially lose millions of dollars in failed or incomplete missions (Black & Mendenhall, 1990), due simply to individual biases in self-reporting.

From this discussion, it is apparent that measuring metacognition via self-report methods is problematic (see Veenman, Prins, & Verheij, 2003). Aside from the fact that individuals are generally unaware of their metacognitive skills, many will likely overestimate their ability, which could lead employers to make, at best, faulty conclusions about individual performance, or at worst, poor selection decisions. As such, metacognition will be assessed in the present study using a performance-based measure based off of a modified version of the KMA described in Chapter 2. The KMA is amenable to this particular study for three reasons. First, the conceptual basis for the measure borrows heavily from signal detection theory (Green & Swets, 1966; McNicol, 2004; Swets, 1996), which helps establish its viability as a measure of metacognition. Second, the KMA has been validated a number of times across a variety of different performance settings, suggesting that applications to other contexts, such as cross-cultural settings, will not pose an issue. Third, the format of the KMA is both simple and straightforward, making administration and data collection less problematic. Specific modifications to the test as well as statistical analyses will be discussed in more detail in Section 4.5.

## **4.2 Methods**

### *4.2.1 Participants and Procedure*

A subsample of participants from Study 1 was used for the analyses in Study 2. Specifically, the subsample comprised 50 undergraduate students from the University of Illinois at Urbana-Champaign who were enrolled under international status (i.e., held citizenship outside of the United States). As in Study 1, target respondents (66% female; mean age = 20.3; 74%

Asian, 14% Caucasian, 2% African/Black, 4% other) were recruited via the university's undergraduate Psychology subject pool and participated in the study for course credit.

The reader should be made aware that the sample size for this study was extremely low. This was primarily due to the small proportion of international students accessible through the subject pool for participation in research (less than 10% of the total number of potential subject pool participants designated themselves as international students). Thus, the findings presented in Study 2 should be interpreted with caution.

#### 4.2.2 Measures

Measures were given to participants in the following order: a measure of performance-based metacognitive skill, a measure of self-reported metacognitive skill, a test of cognitive ability, a measure of self-efficacy, a measure of personality, and a brief demographic survey. Detailed descriptions of each measure are provided below.

*Metacognitive skill (performance-based).* Performance-based metacognitive skill was assessed using a culture-based adaptation of the Knowledge Monitoring Assessment (KMA; Tobias & Everson, 1997). Specifically, the Cultural Knowledge Monitoring Assessment (CKMA) is a 32-item two-option multiple-choice test that measures participants' abilities to correctly identify the relative ranking of countries on one of four cultural dimensions (Hofstede, 1980). Participants are given a short blurb describing the cultural dimension in question (e.g., "Individualism, versus its opposite, collectivism, is the degree to which individuals think of themselves as part of a group."), which is followed by an item that asks participants to identify which of the two cultures they believe to be higher on the dimension in question (e.g., Q: Which country do you think is *more individualistic*? A1: The United States OR A2: South Korea). After each item, participants are asked to rate on a scale of 0 to 10 how confident they are in the



accuracy of their answer, where a rating of 0 = 0% confident, 5 = 50% confident, and 10 = 100% confident. At the end of the test, participants are asked to estimate their overall performance (e.g., “Out of all 32 questions, how many do you think you answered correctly?”), as well as the performance of similar others (e.g. “Out of all 32 questions, how many do you think an average college student would answer correctly?”). In doing this, participants’ skills at making both local (i.e., item-level) and global (i.e., test-level) performance predictions can be evaluated.

The CKMA assesses individuals’ standing on two constructs: metacognitive skill and cultural knowledge. Participants’ cultural knowledge scores are represented by overall test performance (i.e., number of items answered correctly, irrespective of confidence level). Participants with higher sums are presumed to possess higher levels of cultural knowledge.

Metacognitive skill is typically assessed by calculating the difference between participants’ actual and estimated performance. This formula, referred to as the absolute accuracy index (Schraw, 2009), is mathematically equivalent to calculating the mean squared error (MSE):

$$\text{Absolute Accuracy Index} = \frac{1}{N} \sum_{i=1}^N (c_i - p_i)^2$$

where  $c_i$  corresponds to the confidence rating for item  $i$  (continuously scored: 0 = 0% confident to 10 = 100% confident), and  $p_i$  corresponds to performance on item  $i$  (i.e., dichotomously scored: 0 = incorrect, 1 = correct). Despite being the standard method by which performance-based metacognitive skill is measured (Tobias & Everson, 1997), the AAI’s reliance on difference scores is highly problematic. Generally speaking, difference scores operate under the assumption that the congruence (or incongruence) between two observed variables can be used as a proxy for some third unobserved variable (Edwards & Parry, 1993). For example, in the present study, the difference between participants’ confidence ratings and performance is used as

the operationalization for the unobserved variable metacognitive skill, which, in turn is used to predict sociocultural adaptation. The relationship between these three variables can be represented by the following regression equation:

$$SA = b_0 + b_1(C_i - P_i)^2 + e \quad (4.0)$$

where  $SA$  represents sociocultural adaptation, and  $C_i$  and  $P_i$  represent participants' confidence ratings and performance, respectively. Conceptually, proponents of the difference score approach treat the quantity  $(C_i - P_i)^2$  as a single variable, such that increases in the *difference* between  $C_i$  and  $P_i$  correspond to proportional increases in the outcome variable  $SA$ . If one decomposes this equation further, however, it is revealed that three separate relationships actually exist: one between  $SA$  and  $C_i^2$ , one between  $SA$  and  $P_i^2$ , and one between  $SA$  and the interaction between  $C_i$  and  $P_i$ . To elaborate:

$$SA = b_0 + b_1C_i^2 - 2b_1C_iP_i + b_1P_i^2 + e \quad (4.1)$$

Now, changes in the value of  $SA$  correspond to not only increases in the squared values of  $C_i$  and  $P_i$ , but also decreases in *twice* the quantity of their interaction,  $C_iP_i$ . Also,  $C_i^2$  and  $P_i^2$  are forced to have the same regression coefficient ( $b_1$ ) in the above equation. In this respect, the interpretation of a difference score, particularly its relation to a third variable, becomes remarkably more vague and complicated. In response, researchers have suggested using alternative methods, such as polynomial regression, to more accurately assess the combined effects of component measures on unobserved variables (Edwards, 1994; Edwards & Parry, 1993). Polynomial regression is a viable alternative to difference scores because it allows researchers to model not only the relationships prompting the use of difference scores (that is, the relationship between  $C_i$ ,  $P_i$ , and  $SA$ ), but also more complex relationships that difference scores

are unable to capture. To illustrate, an example of a polynomial regression equation using the same set of variables is given below:

$$SA = b_0 + b_1C_i + b_2P_i + b_3C_i^2 + b_4C_iP_i + b_5P_i^2 + e \quad (4.2)$$

In comparing this regression equation to the previous, one can see that the variables in the two equations are partly overlapping/similar (i.e., both models include  $C_i^2$ ,  $P_i^2$ , and  $C_iP_i$  on the predictor side). Thus, increases in  $C_i$  correspond to proportional increases in  $SA$ , increases in  $P_i$  correspond to proportional increases in  $SA$ , and so forth. However, each component in Equation 4.2 is assigned a unique regression coefficient, such that its effect on  $SA$  is estimated independently of the other components. This improves upon the use of a squared difference score as an indicator variable, in that the corresponding components' regression coefficients,  $b_1$  and  $b_2$ , are not constrained to 0, nor are their higher-order coefficients,  $b_3$ ,  $b_4$ , and  $b_5$ , constrained to be equal to one another.

Given the numerous problems associated with the use of difference scores as predictor variables (for a comprehensive review, see Edwards, 2002), polynomial regression was employed in the present study as a means by which to assess the effects of metacognitive skill on sociocultural adaptation. Specifically, equation 4.2 was used to model the joint effects of participants' confidence ratings ( $C_i$ ) and participants' actual test performance ( $P_i$ ) on sociocultural adaptation ( $SA$ ), as well as the effects of their squared terms ( $C_i^2$  and  $P_i^2$ ) and interaction ( $C_iP_i$ ).

Confirmatory analyses for the polynomial regression model provided in Equation 4.2 were based on the procedures outlined by Edwards (2002). Edwards stipulates that a series of models comparing equations formulated using a difference score approach (i.e., constrained equations) with equations that incorporate higher order factors (i.e., unconstrained equations)

should be evaluated. For example, a test of the lower-order linear terms, known as the algebraic congruence model, evaluates the difference between the following two equations:

$$SA = b_0 + b_1(Ci - P_i) + e \quad (4.3)$$

$$SA = b_0 + b_1Ci + b_2P_i + e \quad (4.4)$$

In this model, a constrained equation (4.3) incorporating the linear difference score,  $(Ci - P_i)$ , as a predictor is compared with an unconstrained equation (4.4) incorporating the first-order (linear) polynomial terms,  $Ci$  and  $P_i$ , as predictors. The next model, referred to as the squared difference model, includes both linear terms and higher order terms as predictors; this model compares the constrained equation represented by Equation 4.0 with the unconstrained equation represented by Equation 4.2, and is the primary test for polynomial effects.

After the constrained and unconstrained equations have been specified, each model is evaluated in sequential order (i.e., algebraic, squared difference) with respect to the following four conditions: (1) the variance explained by the equation of interest differs from 0 (i.e.,  $R^2$  values for the unconstrained equation are significant), (2) the regression coefficients expected to have nonzero values differ from zero and are in the expected direction, (3) the constraints corresponding to the overall model are satisfied (i.e., no significant difference between  $R^2$  for constrained and unconstrained models), and (4) the variance explained by the next set of higher order terms does not differ from 0 (i.e., the F test for quadratic terms (for the absolute difference model) and cubic terms (for the squared difference model) are not significant).

For the present study it was hypothesized that congruence between performance and confidence in one's performance on the CKMA would be positively related to sociocultural adaptation. A 3-dimensional response surface is given in Figure 2 to illustrate this hypothesis graphically. When interpreting the surface, the XY plane featured on the "floor" of the 3-

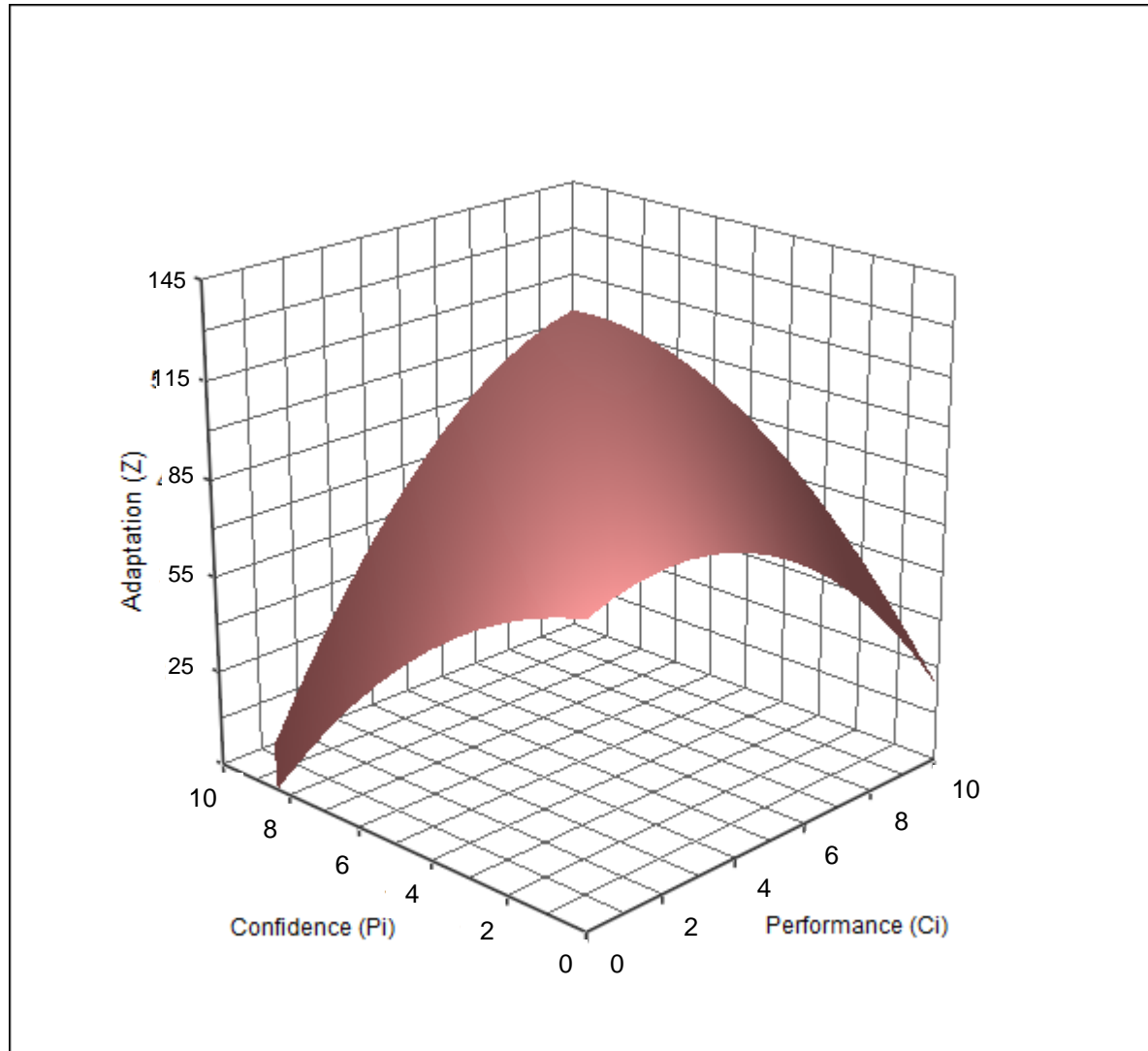
dimensional space provides the most straightforward information about the relationship between the three variables. Specifically, the shape of the surface around the line  $Y = X$ , which bisects the plane diagonally from the southwest corner to the northeast corner, represents the effects on the outcome variable when the relationship between the two components are congruent. In Figure 2, the surface is at a maximum around the line  $Y = X$ , suggesting that the more congruent performance and confidence judgments are (i.e., the higher metacognitive skill is), the higher the level of sociocultural adaptation.

On the other hand, the shape of the surface around the line  $Y = -X$ , which bisects the plane diagonally from the northwest corner to the southeast corner, represents the effects on the outcome variable when the components are not congruent. In Figure 2, the surface slopes downward as it moves away from the origin in either direction. This suggests that the more incongruent performance and confidence judgments are (i.e., the lower metacognitive skill is), the lower the level of sociocultural adaptation.

*Metacognitive skill (self-reported).* Researchers have largely supported multi-method approaches to measuring metacognition (Desoete, 2008; Veenman, 2005; Veenman, et al., 2006). Thus, metacognitive skill was assessed using both a performance-based measure (CKMA) and a self-report measure. Self-reported metacognitive skill was measured via the 4-item metacognitive subscale of the Cultural Intelligence Scale (CQS; Ang, et al., 2004).

*Sociocultural adaptation.* For the present study, cross-cultural performance was conceptualized as an individual's ability to adapt successfully to new cultural environments. In keeping with this definition, participants' cross-cultural performance was assessed using the Sociocultural Adaptation Scale (SCAS; Searle & Ward, 1990; Ward & Kennedy, 1999). The SCAS is a 29-item measure that asks participants to rate the level of difficulty they face engaging

Figure 2. Hypothesized 3-D response surface of adaptation on performance and confidence



in everyday behaviors while living in a foreign country (e.g., “making friends”, “finding your way around”, “making yourself understood”). Participants respond to each item on a scale of 1 (no difficulty) to 5 (extreme difficulty). Scores are then summed across all 29 items. Generally speaking, higher scores are indicative of greater problems with adapting to new cultures; however, for ease of interpretation, items were reverse-scored so that higher scores would be indicative of greater levels of adaptation. The SCAS has been heavily used in research examining intercultural adaptation and has evidenced good reliability and validity across a wide variety of samples and contexts (Ward & Kennedy, 1999).

*Self-efficacy.* The purpose of measuring self-efficacy in the present study was to assess whether its relationship with self-reported metacognitive skill and performance differed from its relationship with performance-based metacognitive skill and performance. Self-efficacy was measured using the general self-efficacy scale (GSES) developed by Sherer and colleagues (1982). The GSES is a 23-item questionnaire that asks participants to indicate their level of agreement with statements describing efficacious beliefs (e.g., “When I make plans, I am certain I can make them work”). Participants responded along a 5-point scale where 1 = strongly disagree and 5 = strongly agree. The GSES comprises two subscales, the Achievement Self-Efficacy subscale (17 items) and the Social Self-Efficacy subscale (6 items). The Achievement subscale focuses on goal attainment, whereas the Social subscale focuses on the development of interpersonal relationships. The GSES is the most widely used tool to assess general self-efficacy. It has been validated in several different contexts, including expatriate adjustment (Shaffer, Harrison, & Gilley, 1999), and through various analytical techniques (Scherbaum, Cohen-Charash, & Kern, 2006).

*Personality.* To examine and control for the potential effects of personality on performance, the Big Five (i.e., Extraversion, Agreeableness, Conscientiousness, Neuroticism, Openness; Goldberg, 1990) was measured using the Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). The BFI is a 44-item questionnaire that asks participants to indicate their level of agreement with various characteristics describing their personality (e.g. “I am someone who makes plans and follows through with them”, “I am someone who is full of energy”). Participants rate their agreement along a 5-point scale where 1 = strongly disagree and 5 = strongly agree. Previous studies have shown that the BFI demonstrates high internal consistency ( $\bar{\alpha} = .80$ ) and high test-retest reliability over a 3-month period ( $\bar{r} = .85$ ; Benet-Martínez & John, 1998).

*Cognitive Ability.* Metacognition, though an independent construct, is moderately correlated with cognitive ability in some domains (van der Stel & Veenman, 2008). Thus, it was important to include a measure of cognitive ability in this study so that one could discern its contribution to performance from that of metacognitive skill.

Cognitive ability was measured by way of performance on a selection of math and verbal items taken from a standardized test-prep item bank (Kim, Chiu, & Zou, 2010). For comparison purposes, participants were also asked to provide confidence judgments for each of the items on the cognitive ability test. Confidence judgments were administered using the same 0 to 10 scale as on the CKMA, where 0 = 0% confident and 10 = 100% confident. Participants were also asked to provide global judgments of their performance at the end of test by estimating how many items, out of 20, they believed they answered correctly.

*Demographics.* Participants were given a brief, 14-item questionnaire that asked them to report biographical information, such as their gender, age, ethnicity, year in school, and field of



study. Participants were also asked questions regarding their exposure to and experience with different cultures. These questions included participants' country of origin, parents' country of origin, number of languages spoken, number of non-native countries visited, and the percentage of close friends who do not share participants' nationalities.

### **4.3 Results**

Means, standard deviations, and correlations are reported in Table 7. Scale reliabilities for most measures were acceptable. The one exception to this was the CKMA, whose reliability was extremely low ( $\alpha = .26$ ). This was most likely due to two factors: (1) the CKMA is a new measure and has not been validated by previous research. Thus, it is unclear whether the items comprising the CKMA represent a valid test of cultural knowledge or are reflective of some other construct(s); (2) cultural knowledge is most likely a multidimensional construct, in that one's knowledge about different cultures is not equal across cultures themselves. For example, an individual may be very familiar with Chinese culture but may be very unfamiliar with Hispanic culture. As such, that individual's score on the CKMA would be heavily skewed in favor of those items assessing Chinese cultural knowledge and against those assessing Hispanic cultural knowledge. To further explore this assertion, a principal components analysis was conducted on the CKMA to determine how many unique factors could be extracted from the test's 32 items. The resultant scree plot is presented in Figure 2. Using the scree test proposed by Cattell (1966), it was subjectively determined that the CKMA comprised multiple factors. The presence of more than one factor is problematic in that it signals considerable multidimensionality and is likely a significant contributor to the measure's extremely low reliability. In response to this concern, the cognitive ability test (and corresponding confidence judgments, heretofore referred to as the CAMA) was used in lieu of the CKMA for the

remainder of the analyses. This substitution is still in keeping with the original hypothesis, given that metacognition is purported to be a domain-general construct; in other words, it is not the content of the knowledge itself that is important in the assessment of metacognitive skill, but rather individuals' awareness of that knowledge and their ability to judge it accurately.

#### *4.3.1 Performance-based metacognitive skill and adaptation*

To determine the effects of performance-based metacognitive skill on sociocultural adaptation, a series of polynomial regression equations was analyzed. To begin, the algebraic difference model, which examined the lower-order relationships between the two predictor and one outcome variables, was evaluated. Based on the results presented in Table 8, neither the constrained nor the unconstrained equations reached statistical significance; as such, it was not necessary to test the difference in  $R^2$  between the two equations. Next, the squared difference model was evaluated for potential effects stemming from higher-order terms. For this model, all but one of the terms failed to reach statistical significance. The exception to this was the linear term for confidence judgments ( $C_i$ ); however, given the small sample size, standardized regression coefficient greater than 1.0, and nonsignificant raw correlation between confidence judgments and sociocultural adaptation, this finding was most likely a statistical artifact. Thus, the hypothesis that metacognitive skill would be predictive of adaptation (i.e., performance in cross-cultural settings) was not supported. Again, this result should be interpreted with the caveat that the statistical power for this analysis was abysmally low ( $1-\beta = 0.30$ ; Shieh, 2009), and thus findings are preliminary, at best.

Despite the lack of support for the study's hypotheses, the zero-order correlations with sociocultural adaptation merit mention. In Table 7, it can be seen that general self-efficacy ( $r = .49$ ), openness ( $r = .33$ ), and conscientiousness ( $r = .32$ ) are all positively correlated with

Table 7. Means, standard deviations, correlations, and scale reliabilities

	<i>MN</i>	<i>SD</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>
1. Sociocultural adaptation	108.50	18.74	(.93)										
2. Cultural knowledge (Perf)	18.92	2.53	0.17	(.24)									
3. Cultural knowledge (Conf)	17.96	5.04	-0.14	-0.05	(--)								
4. Cognitive ability (Perf)	16.56	5.77	0.26	0.23	-0.11	(.77)							
5. Cognitive ability (Conf)	8.87	3.49	0.24	0.21	0.11	0.55**	(--)						
6. Cognitive ability (Self)	10.64	3.29	0.28*	0.24	-0.19	0.50**	0.81**	(--)					
7. Metacognitive CQ	4.82	0.97	-0.01	0.24	-0.13	0.04	-0.14	-0.02	(.65)				
8. Cognitive CQ	3.79	1.10	-0.16	0.26	0.14	0.10	0.04	0.05	0.53**	(.80)			
9. Motivational CQ	4.89	1.00	0.07	0.10	0.23	-0.07	0.03	-0.04	0.38*	0.27	(.68)		
10. Behavioral CQ	4.47	1.05	0.09	0.23	0.02	-0.02	-0.11	-0.07	0.67**	0.34*	0.31*	(.71)	
11. General self-efficacy	3.45	0.50	0.49**	-0.03	0.10	0.13	0.35*	0.28*	-0.07	-0.19	0.12	0.16	(.86)
12. Social self-efficacy	3.34	0.58	0.29	-0.11	0.26	-0.21	0.24	0.14	-0.09	-0.28*	0.18	0.03	0.40**
13. Extraversion	3.30	0.70	0.23	-0.25	0.25	-0.15	0.10	0.06	0.05	-0.26	0.01	0.09	0.39**
14. Agreeableness	3.73	0.53	0.14	0.18	-0.02	0.04	0.11	0.07	-0.01	-0.26	0.11	0.12	0.26
15. Conscientiousness	3.48	0.57	0.32*	0.06	0.11	-0.07	0.17	0.18	0.05	-0.01	0.22	0.17	0.66**
16. Neuroticism	2.91	0.70	-0.34*	-0.16	-0.08	0.12	-0.03	-0.09	0.02	0.02	-0.10	-0.19	-0.62**
17. Openness	3.42	0.51	0.33*	0.28	-0.02	0.10	0.29*	0.38**	0.24	-0.04	0.11	0.26	0.40**
18. Other language (Y=1)	0.62	0.49	0.06	-0.15	0.15	-0.12	0.11	0.05	-0.33*	-0.54**	-0.19	-0.10	0.23
19. Travel experience (Y=1)	1.15	0.36	0.12	-0.22	0.07	0.18	0.18	0.11	-0.20	-0.25	-0.24	-0.24	0.04
20. Gender (F=1)	1.63	0.48	-0.06	-0.15	-0.21	-0.21	-0.27	-0.21	0.23	0.11	0.07	0.13	-0.12
21. Age	19.76	1.58	-0.23	0.21	0.16	-0.10	0.12	0.09	0.13	0.10	0.26	0.20	0.07

N = 50; \*  $p < .05$ ; \*\*  $p < .01$

NOTE: Cultural knowledge (Perf) and Cognitive Ability (Perf) refer to raw performance scores on each test; Cultural knowledge (Conf) and Cognitive Ability (Conf) refer to confidence judgments aggregated across all test items; Cognitive Ability (Self) refers to participants' overall estimates of their performance on all test items (i.e., "Out of all 20 items, how many do you think you answered correctly?")

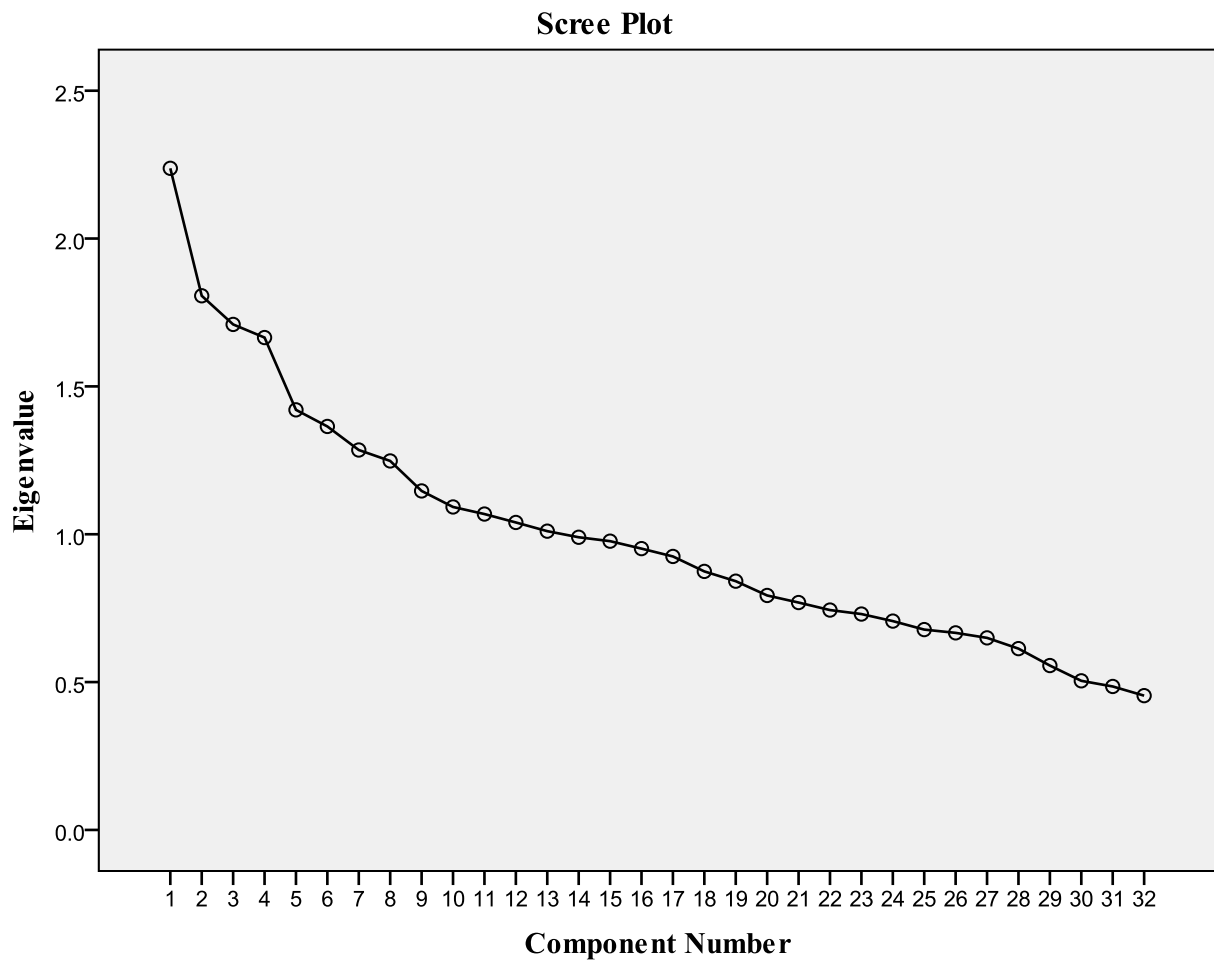
Table 7, *contd.* Means, standard deviations, correlations, and scale reliabilities

	<i>MN</i>	<i>SD</i>	<i>12</i>	<i>13</i>	<i>14</i>	<i>15</i>	<i>16</i>	<i>17</i>	<i>18</i>	<i>19</i>	<i>20</i>
1. Sociocultural adaptation	108.50	18.74									
2. Cultural knowledge (Perf)	18.92	2.53									
3. Cultural knowledge (Conf)	17.96	5.04									
4. Cognitive ability (Perf)	16.56	5.77									
5. Cognitive ability (Conf)	8.87	3.49									
6. Cognitive ability (Self)	10.64	3.29									
7. Metacognitive CQ	4.82	0.97									
8. Cognitive CQ	3.79	1.10									
9. Motivational CQ	4.89	1.00									
10. Behavioral CQ	4.47	1.05									
11. General self-efficacy	3.45	0.50									
12. Social self-efficacy	3.34	0.58	(.72)								
13. Extraversion	3.30	0.70	0.74**	(.83)							
14. Agreeableness	3.73	0.53	0.43**	0.28*	(.77)						
15. Conscientiousness	3.48	0.57	0.27	0.08	0.25	(.80)					
16. Neuroticism	2.91	0.70	-0.16	-0.13	-0.23	-0.53**	(.83)				
17. Openness	3.42	0.51	0.35*	0.37**	0.30*	0.25	-0.41**	(.77)			
18. Other language (Y=1)	0.62	0.49	0.32*	0.26	0.18	0.14	0.02	0.03	(--)		
19. Travel experience (Y=1)	1.15	0.36	-0.13	-0.02	-0.18	0.02	0.13	-0.09	0.43**	(--)	
20. Gender (F=1)	1.63	0.48	0.14	0.19	0.24	0.06	0.32*	-0.08	-0.12	-0.17	(--)
21. Age	19.76	1.58	-0.06	-0.06	0.10	0.24	-0.15	-0.03	0.04	-0.13	-0.04

N = 50; \*  $p < .05$ ; \*\*  $p < .01$

NOTE: Cultural knowledge (Perf) and Cognitive Ability (Perf) refer to raw performance scores on each test; Cultural knowledge (Conf) and Cognitive Ability (Conf) refer to confidence judgments aggregated across all test items; Cognitive Ability (Self) refers to participants' overall estimates of their performance on all test items (i.e., "Out of all 20 items, how many do you think you answered correctly?")

Figure 3. Scree plot of PCA for Cultural Knowledge Monitoring Assessment (CKMA)



sociocultural adaptation. These exploratory findings will be addressed in greater detail in the Discussion for Study 2.

#### *4.3.2 Self-report-based metacognitive skill and adaptation*

Given that the relationship between performance-based metacognitive skill and sociocultural adaptation was not statistically significant, it was also important to determine whether there existed a relationship between self-reported cultural metacognition and adaptation. Adaptation, though typically thought of as a behavioral construct, was measured using participants' ratings of their own behaviors, rather than the behaviors themselves. As such, it was possible that a self-report measure of metacognitive skill would be a stronger predictor of self-reported adaptation in the present study, due to perceptual biases and other method effects. A hierarchical regression procedure was used for these post hoc analyses, starting first with the control variables in Step 1, followed next by the scores from the metacognitive subscale of the CQS in Step 2.

The results, presented in Table 9, were equally inconclusive. Like before, there were no relationships that reached statistical significance, with the exception of participants' age in Step 1 ( $t(49) = 2.06, p < .05$ ). Thus, the hypothesis that self-reported metacognitive skill would be a significant predictor of sociocultural adaptation was not supported. Again, it should be noted that the statistical power of these tests was woefully inadequate ( $1-\beta = 0.29$ ), given the sample size, and that conclusions drawn from the results should be done so with caution.

#### **4.4 Discussion**

The purpose of Study 2 was to a) explore the potential of a newly-developed measure of culturally-contextualized metacognitive skill, and b) use this measure to determine whether metacognitive skill was a valid predictor of performance in cross-cultural settings. Specifically,

Table 8. Polynomial regression of sociocultural adaptation on performance-based metacognitive skill

**Algebraic Difference Model**

<i>Constrained Equation</i>		<i>Unconstrained Equation</i>		
$(C_i - P_i)$	$R^2$	$C_i$	$P_i$	$R^2$
-0.335	0.004	-0.786	-0.805	0.081

**Squared Difference Model**

<i>Constrained Equation</i>		<i>Unconstrained Equation</i>					
$(C_i - P_i)^2$	$R^2$	$C_i$	$P_i$	$C_i^2$	$C_i P_i$	$C_i^2$	$R^2$
0.093	0.009	0.509	-1.908*	0.123	-1.173	2.297	.201

Note: N = 50; Estimates are based off of standardized coefficients;  $C_i$  = raw score of actual performance on the cognitive ability test;  $P_i$  = confidence judgments aggregated across all items on the cognitive ability test

\*  $p < .05$

*Table 9.* Hierarchical regression of sociocultural adaptation on self-reported metacognitive skill

<i>Variable</i>	<i>Sociocultural Adaptation</i>	
	<i>Step 1</i>	<i>Step 2</i>
Gender	-0.02	-0.02
Age	-0.28*	-0.28
Language experience	-0.04	-0.04
General self-efficacy	0.36	0.36
Openness	0.12	0.12
Extraversion	0.03	0.03
Conscientiousness	0.09	0.09
Neuroticism	-0.05	-0.05
Agreeableness	0.01	0.01
Metacognitive CQ		0.01
<i>F</i>	2.22*	1.95
$\Delta F$	--	-0.29
$R^2$	0.33	0.33
$\Delta R^2$	--	0.00
<i>Adjusted R<sup>2</sup></i>	0.18	0.16

Note: N = 50; Estimates are based off of standardized coefficients

\*  $p < .05$



the CKMA, a performance-based measure of metacognitive skill, was used to predict international students' self-reported difficulty in adapting to life in the United States. Based on the results of the polynomial regression analyses, the hypothesis that students with higher levels of metacognitive skill would face fewer difficulties with regard to cultural adaptation was not supported. These results were identical for a separate set of regression analyses conducted using the self-report measure of metacognitive skill from the CQS.

Despite a lack of significant findings with regard to metacognitive skill, a selection of the statistically significant correlations involving the dependent variable, sociocultural adaptation, bears mentioning. Of particular note is the relationship between sociocultural adaptation and self-efficacy, as well as that between sociocultural adaptation and personality. Each of these variables is likely to play an important role in the adaptive process for different reasons. Self-efficacy, defined earlier as the belief in one's ability to obtain a desired goal or outcome (Bandura, 1977), may influence the extent to which an individual persists in his or her efforts to adapt to a new culture. Researchers studying the effects of self-efficacy on adjustment, in general, have found support for this contention, such that individuals with higher efficacy beliefs are more likely to initiate action, carry through on their actions, and perform better overall than individuals with lower efficacy beliefs (Bandura, 2002; Epel, Bandura, & Zimbardo, 1999). Findings from meta-analytic studies on expatriate performance have also shown that self-efficacy is a significant predictor of adaptation to and adjustment in cross-cultural environments (Bhaskar-Shrinivas et al., 2005).

Individual differences in personality may also exert some effect on adaptation. In the present study, significant correlations were found between sociocultural adaptation and openness ( $r = .33$ ), conscientiousness ( $r = .32$ ), and neuroticism ( $r = -.34$ ). The relationship between

openness and adaptation has enjoyed a rich history in the cross-cultural literature (Gudykunst & Ting-Toomey, 1988; Ones & Viswesvaran, 1997; Ward, Berno, & Main, 2002; Ward, Leong, & Low, 2004). Openness, which encompasses the willingness to try new things and intellectual curiosity, has been frequently identified as a prerequisite for successful intercultural interactions. This should come as no surprise, given that open-minded individuals are generally more accepting of new ideas and of differences in other people, both of which are common features of cross-cultural contexts. The effects of neuroticism and conscientiousness on adaptation, though less obvious, are still of great importance. Neuroticism, which encompasses anxiety, impulsivity, and hostility, has been shown in previous research to be negatively related to adjustment in cross-cultural contexts (Furukawa & Shibayama, 1993). Specifically, individuals who exhibit high levels of neuroticism are more likely to experience both psychological and interpersonal maladjustment, particularly those that are predisposed to depressive symptoms. On the other hand, conscientiousness, which embodies order, dutifulness, and determination, has a positive relationship with adaptation, and may operate in the same way as self-efficacy in that it drives individuals toward achieving their goals. Although very few studies have been conducted that explicitly examine the effects of conscientiousness on cross-cultural adaptation, findings showing a positive relation between conscientiousness and general psychological adjustment hold promise for future research (Costa & McCrae, 1992).

## CHAPTER 5: GENERAL DISCUSSION

### 5.1 Overview

The purpose of the proposed research was threefold: to assess the construct validity of a popular measure of metacognition, to explore an alternative means by which to assess metacognition, and to examine the effects of metacognition on cross-cultural performance. These propositions were tested in a series of studies that attempted to answer two important questions about cultural metacognition. First, is cultural metacognition, and, more generally, cultural competence, distinct from personality? Study 1 addressed this question by assessing the discriminant validity of the Cultural Intelligence Scale (CQS) with a self-report measure of the Big Five personality traits, the Big Five Inventory (BFI). Through the application of structural equation modeling techniques, it was found that the four subscales of the CQS were indeed distinct from the five subscales of BFI. This implies that the subfacets of cultural competence, which includes cultural metacognition, are measuring different constructs than the Big Five personality traits. This is particularly relevant for the trait of openness, which has often been designated as a major determinant of successful performance in cross-cultural contexts (Ones & Viswesvaran, 1997).

Study 1 also illuminated a rather strong relationship between cultural metacognition and the other subfacets of cultural competence. Whereas studies in the past have shown small to moderate correlations between the four subscales of the CQS (Ang et al., 2007), the findings from the MTMM analysis conducted in the present study suggest that these interrelationships may actually be quite large. Of particular concern were the correlations between the latent Metacognitive CQ factor and the other three latent CQ factors ( $\phi = .83 - .86$ ). Though the discrepancy in results between the two studies may be partly due to sampling variability, it is

also possible that the latent factor correlations from Study 1 are actually detecting greater inter-subscale overlap. This suggestion is made even more plausible if one observes that the average raw subscale correlations across the two sets of studies differed only slightly in magnitude (i.e., the subscales were operating similarly for both studies). Thus, it appears that the subscales of the CQS are highly related to one another, and that, consequently, the Metacognitive CQ subscale may not be assessing cultural metacognition as accurately as originally intended.

Given these findings, it is questionable whether previously observed effects of cultural metacognition, as measured by the CQS, are valid. If this is the case, what, then, is the most appropriate way to measure cultural metacognition? This question was addressed in Study 2, in which it was hypothesized that metacognitive skill, as assessed by a performance-based measure, would predict adaptation to new cultural environments. Specifically, it was hypothesized that participants who exhibited greater congruence between ratings of their own performance and their actual performance on a cognitive ability test would face fewer difficulties in adapting to a foreign culture than those exhibiting less congruence. A polynomial regression analysis was used to test this hypothesis on a small sample of international students enrolled at a university in the United States. Unfortunately, the results of these analyses did not show support for the original hypothesis. As such, it remains to be seen whether a performance-based measure is capable of providing a more valid assessment of cultural metacognition than a self-report measure like the CQS.

## **5.2 Limitations**

There were several limitations with respect to the two studies presented here. Perhaps one of the most glaring weaknesses was the size and composition of the subsample used in Study 2. To begin, the sample comprised only 50 participants. This dreadfully small *N*, which was largely

a consequence of limited access to the university's population of international students, greatly reduced the statistical power needed to detect significant effects, if such effects did indeed exist. This limitation was particularly relevant given the number of variables that were included in the full polynomial regression model. For future studies, a sample of much larger size would need to be collected before any conclusions regarding the relationship between cultural metacognition and adaptation could be made.

There is also the concern that the sample, though composed of international students, was too Westernized, thereby reducing the variability in responses to the SCAS (mean score = 108, out of a possible 145; standard deviation = 18.74). Generally speaking, nearly all international students who enroll in American universities are, at the very least, fluent in English, and more often than not, very familiar with Western culture. Therefore, many of these individuals are likely to face fewer difficulties adjusting to the sociocultural milieu of the United States than other individuals who are less familiar with foreign cultures. This is particularly true for individuals who do not belong to college-based populations, such as members of the military or expatriate employees. As such, this lack of response variance may have suppressed any effects of metacognitive skill on adaptive behavior that may have otherwise been detected in a less acculturated sample.

The decision to use a self-report measure of adaptive behavior may also have limited the scope of findings for Study 2. Given that adaptation is a behavioral construct, assessing it by means of a self-report necessarily excludes critical information pertaining to the actual performance of adaptive behaviors. Thus, findings that implicate adaptation as an outcome variable, such as those given in Study 2, should really be perceived as findings related to self-reported adaptation. For future research, it would be beneficial to measure adaptation using

behavioral observations (e.g., supervisors, peers) as they may provide a more accurate assessment of whether individuals are adapting successfully to their cultural surroundings.

Finally, it should be reiterated that the measure intended to assess cultural metacognition in Study 2, the CKMA, was problematic. Aside from lacking previous empirical validation, the CKMA exhibited extremely low reliability ( $\alpha = .26$ ) and was found to be multidimensional. Whereas the cognitive ability counterpart to the CKMA, referred to as the CAMA, provided a sufficient substitute for measuring metacognition in Study 2, it is still worthwhile to continue seeking alternative methods for assessing cultural metacognition, in particular. A potential solution would be to create a knowledge test that focuses on only one culture rather than several different cultures, as in the CKMA. In this sense, an individual's level of cultural knowledge (and likewise, cultural metacognition) could be assessed with reference to a target culture, rather than across multiple cultures simultaneously. This approach would have particular utility for individuals traveling to a single country, such as in cases involving study-abroad students or expatriates.

### **5.3 Implications**

The findings presented in Study 1 and Study 2, though preliminary, still hold implications for both future research and organizational strategy. For example, Study 1 demonstrated that cultural metacognition is not simply the relabeling of “old wine in new bottles”; rather, cultural metacognition contributes uniquely to the shaping of individuals' thoughts and behaviors above and beyond that of personality. This suggests that cultural metacognition should still be considered an important element in research on cross-cultural performance and adaptation. Similarly, organizations and employers should begin to recognize the potential of metacognition as a selection criterion or component of training programs, particularly for those employees who

are assigned to work internationally. Doing so will not only serve to build a more culturally competent workforce, but also provide individuals with a way to adjust to new cultural environments that is both effective and efficient.

Furthermore, findings from the present studies highlight the need for and importance of considering the methodological approach by which one measures more abstract constructs, such as metacognitive skill. Study 1, for example, elucidated some of the issues facing the use of self-report measures of cultural competence, as well as the value of including other-ratings as part of an individual's assessment. The findings from Study 2, though nonsignificant, still illuminate the potential for using non-self-report measures in the assessment of metacognition. These two studies thereby suggest that individuals or groups who plan to use measures of metacognition as predictors of performance should first consider the source of those assessments (self vs. peer) in addition to the specific aspects of metacognition those assessments are tapping into (self vs. performance) before such assessments are administered, as the choice made in both cases will likely influence the results of the assessment as well as the subsequent conclusions one can draw from them.

Though the full extent to which cultural metacognition influences adaptive outcomes remains to be seen, it is suggested that future studies continue to seek out new and innovative means by which to conceptualize and measure metacognitive skill. Indeed, many of the concerns facing global organizations today can be remedied if the factors most readily influencing and facilitating cross-cultural adaptation are identified and understood. Based on the collection of findings from this and previous research, the construct of metacognition is believed to hold great promise to this end.

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## APPENDIX

### *Cultural Knowledge Monitoring Assessment (CKMA)*

This section is designed to test how much you know about other cultures. Over the next several screens, you will be given items that will ask you to compare two countries on a certain dimension. These dimensions (four in total) are individualism, power distance, masculinity, and uncertainty avoidance. Descriptions of each dimension will be given for each item, so there is no need to memorize anything. Just use the information provided and what you already know about the countries in question. After each item, you will be asked to rate how confident you are that the answer you provided is correct. Your answer here will not count toward your total score, so please be as honest as possible.

**Individualism (IDV)**, versus its opposite, collectivism, is the degree to which individuals think of themselves as part of a group. In individualist cultures, people are expected to develop and display their individual personalities and to choose their own affiliations. In collectivist cultures, people are defined and act mostly as a member of a long-term group, such as the family, a religious group, an age cohort, a town, or a profession, among others.

**Power Distance Index (PDI)** is the extent to which less powerful members of institutions (e.g., the government, work, family) accept and expect that power is distributed unequally. In cultures with low power distance, people accept power relations that are more equal and democratic (e.g., democracies). Those with less power are more comfortable with and demand the right to contribute to and critique the decisions of those in power. In cultures with high power distance, the less powerful accept power relations that are unequal or paternalistic (e.g., dictatorships). Subordinates acknowledge the power of others based on their formal, hierarchical positions.

**Masculinity (MAS)**, versus its opposite, femininity, refers to a culture's adoption of either "masculine" or "feminine" ideals and values. In so-called 'masculine' cultures, people value competitiveness, assertiveness, ambition, and the accumulation of wealth and material possessions. In so-called 'feminine' cultures, people value relationships, nurturing, and quality of life.

**Uncertainty Avoidance Index (UAI)** deals with a society's tolerance for uncertainty and ambiguity. In cultures with high uncertainty avoidance, people prefer rules (e.g. about religion and food) and structure, and employees tend to remain longer with their present employer. In cultures with low uncertainty avoidance, people prefer implicit or flexible rules or guidelines and value informality. In cultures with low uncertainty avoidance, employees tend to change employers more frequently.

#### **Based on what you already know about these countries:**

1i. Which country do you think is *more individualistic*?

- **United States**
- South Korea

• On a scale of 0-10, how confident are you that the answer you chose is correct?

0	1	2	3	4	5	6	7	8	9	10
0%					50%					100%
Confident					Confident					Confident

2i. Which country do you think is *more individualistic*?

- Egypt
- **Australia**

- 3i. Which country do you think is *more individualistic*?
- **Saudi Arabia**
  - Colombia
- 4i. Which country do you think is *more individualistic*?
- **Iran**
  - Panama
- 5i. Which country do you think is *more individualistic*?
- **India**
  - Turkey
- 6i. Which country do you think is *more individualistic*?
- Nigeria
  - **New Zealand**
- 7i. Which country do you think is *more individualistic*?
- **Netherlands**
  - Finland
- 8i. Which country do you think is *more individualistic*?
- Greece
  - **Hong Kong**
- 1p. Which country do you think has *higher power distance*?
- Austria
  - **Russia**
- 2p. Which country do you think has *higher power distance*?
- **Guatemala**
  - Sweden
- 3p. Which country do you think has *higher power distance*?
- **Iraq**
  - Brazil
- 4p. Which country do you think has *higher power distance*?
- Ireland
  - **United Kingdom**
- 5p. Which country do you think has *higher power distance*?
- **Ecuador**
  - El Salvador
- 6p. Which country do you think has *higher power distance*?
- **Venezuela**
  - Peru
- 7p. Which country do you think has *higher power distance*?
- **China**
  - Japan

- 8p. Which country do you think has *higher power distance*?
- **Philippines**
  - Taiwan
- 1m. Which country do you think is *more masculine*?
- **Italy**
  - Sweden
- 2m. Which country do you think is *more masculine*?
- **France**
  - Denmark
- 3m. Which country do you think is *more masculine*?
- Costa Rica
  - **Israel**
- 4m. Which country do you think is *more masculine*?
- **South Africa**
  - Portugal
- 5m. Which country do you think is *more masculine*?
- **Canada**
  - Spain
- 6m. Which country do you think is *more masculine*?
- Ethiopia
  - **Bangladesh**
- 7m. Which country do you think is *more masculine*?
- Malaysia
  - **Japan**
- 8m. Which country do you think is *more masculine*?
- **Slovakia**
  - Vietnam
- 1u. Which country do you think has *higher uncertainty avoidance*?
- Jamaica
  - **Poland**
- 2u. Which country do you think has *higher uncertainty avoidance*?
- **Argentina**
  - India
- 3u. Which country do you think has *higher uncertainty avoidance*?
- **Belgium**
  - Mexico
- 4u. Which country do you think has *higher uncertainty avoidance*?
- Switzerland
  - **Romania**

5u. Which country do you think has *higher uncertainty avoidance*?

- Norway
- **Luxembourg**

6u. Which country do you think has *higher uncertainty avoidance*?

- **Chile**
- Pakistan

7u. Which country do you think has *higher uncertainty avoidance*?

- Thailand
- **Uruguay**

8u. Which country do you think has *higher uncertainty avoidance*?

- **Germany**
- Singapore

**Out of all 32 questions:**

- How many do you think you answered correctly? \_\_\_\_\_
- How many do you think an average college student would answer correctly? \_\_\_\_\_

### *Cultural Intelligence Scale (CQS)*

**Read each statement and select the best response that best describes your capabilities. Select the answer that BEST describes you AS YOU REALLY ARE (1 = strongly disagree; 7 = strongly agree)**

1. \_\_\_\_\_ I am conscious of the cultural knowledge I use when interacting with people with different cultural backgrounds.
2. \_\_\_\_\_ I adjust my cultural knowledge as I interact with people from a culture that is unfamiliar to me.
3. \_\_\_\_\_ I am conscious of the cultural knowledge I apply to cross-cultural interactions.
4. \_\_\_\_\_ I check the accuracy of my cultural knowledge as I interact with people from different cultures.
5. \_\_\_\_\_ I know the legal and economic systems of other cultures.
6. \_\_\_\_\_ I know the rules (e.g., vocabulary, grammar) of other languages.
7. \_\_\_\_\_ I know the cultural values and religious beliefs of other cultures.
8. \_\_\_\_\_ I know the marriage systems of other cultures.
9. \_\_\_\_\_ I know the arts and crafts of other cultures.
10. \_\_\_\_\_ I know the rules for expressing nonverbal behaviors in other cultures.
11. \_\_\_\_\_ I enjoy interacting with people from different cultures.
12. \_\_\_\_\_ I am confident that I can socialize with locals in a culture that is unfamiliar to me.
13. \_\_\_\_\_ I am sure I can deal with the stresses of adjusting to a culture that is new to me.
14. \_\_\_\_\_ I enjoy living in cultures that are unfamiliar to me.
15. \_\_\_\_\_ I am confident that I can get accustomed to the shopping conditions in a different culture.
16. \_\_\_\_\_ I change my verbal behavior (e.g., accent, tone) when a cross-cultural interaction requires it.
17. \_\_\_\_\_ I use pause and silence differently to suit different cross-cultural situations.
18. \_\_\_\_\_ I vary the rate of my speaking when a cross-cultural situation requires it.
19. \_\_\_\_\_ I change my nonverbal behavior when a cross-cultural situation requires it.
20. \_\_\_\_\_ I alter my facial expressions when a cross-cultural interaction requires it.

*Cognitive Ability Knowledge Monitoring Assessment (CAMA)*

Below are twenty questions designed to assess your math and verbal abilities. The first ten questions will be math questions. For each question, select the one option you think is the best answer. After you answer each question, please rate on a scale of 1 to 10 how confident you are in the accuracy of your answer.

Try to spend no more than one (1) minute on each question. If you are not sure of an answer take your best guess and move on.

1M. A number was rounded to 22.7. Which of the following could have been the number before it was rounded?

- 22
- 22.606
- **22.709**
- 22.76
- 23

- On a scale of 0-10, how confident are you that the answer you chose is correct?

0	1	2	3	4	5	6	7	8	9	10
0%					50%					100%
Confident					Confident					Confident

2M. If  $a$  and  $b$  are positive, then the solution to the equation  $bx/(a-x) = 1$  is  $x =$

- $a/(b+1)$
- $(a+1)/(b+1)$
- $(b-1)/a$
- $b/(a+1)$
- $(b+1)/a$

3M. By 7:00PM,  $1/3$  of the junior class had arrived at a school dance. By 8:00PM, 30 more juniors had arrived, raising the attendance to  $1/2$  of the junior class. How many people are in the junior class?

- 30
- 90
- 120
- 180
- 240

4M. If the integer  $n$  is divided by 7, the remainder is 2. What is the remainder if  $5n$  is divided by 7?

- 0
- 2
- 3
- 4
- 5

5M. If  $V/S = 2$  and  $R/S = T/V$ , then for  $T \neq 0$ ,  $R/T = ?$

- $1/2$
- 2
- $T/V$
- $V/2S$

- $2V/S$

6M. The percent increase from 8 to 14 is equal to the percent increase from 20 to what number?

- 14
- 26
- 28
- 32
- 35

7M. What was the initial weight, in pounds, of a person who now weighs  $X$  pounds and who lost  $Y$  pounds and then gained 5 pounds?

- $X + Y - 5$
- $Y - X + 5$
- $X + Y + 5$
- $Y - X - 5$
- $X - Y + 5$

8M. In how many different ways can 5 people arrange themselves in the 5 seats of a car for a trip if only 2 of the people can drive?

- 12
- 15
- 26
- 48
- 120

9M.  $S$  is the sum of the first 100 consecutive positive even integers, and  $T$  is the sum of the first 100 consecutive positive integers.  $S$  is what percent greater than  $T$ ?

- 100%
- 50%
- 10%
- 2%
- 1%

10M. How many positive four-digit integers have 1 as their first digit and 2 or 5 as their last digit?

- 144
- 180
- 200
- 300
- 720

**The next ten questions are verbal questions. For these questions, select the one option you think has the MOST OPPOSITE meaning of the word in capital letters. After you answer each question, please rate on a scale of 1 to 10 how confident you are in the accuracy of your answer.**

**Try to spend no more than one (1) minute on each question. If you are not sure of an answer take your best guess and move on.**

1V. DILATE:

- enclose
- shrink

- hurry
- inflate
- erase

- *On a scale of 0-10, how confident are you that the answer you chose is correct?*

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
0%			50%				100%			
Confident			Confident				Confident			

2V. PERIPHERAL:

- civilized
- partial
- central
- unharmed
- stable

3V. MERITORIOUS:

- effulgent
- stationary
- uneven
- narrow-minded
- unpraiseworthy

4V. ENNUI:

- deliver
- seriousness
- excitement
- stormy
- doubt

5V. MALEDICTION:

- blessing
- preparation
- good omen
- liberation
- pursuit

6V. JEJUNE:

- morose
- natural
- mature
- contrived
- accurate

7V. OBSEQUIOUS:

- original
- haughty



- casual
- virtuous
- informative

8V. GRATUITOUS:

- panic
- heed
- concise
- warranted
- miser

9V. RESTIVE:

- morose
- intangible
- fatigued
- patient
- curious

10V. SATURNINE:

- magnanimous
- ebullient
- finicky
- unnatural
- impoverished

**Out of all 20 questions:**

- How many do you think you answered correctly? \_\_\_\_\_

*Sociocultural Adaptation Scale (SCAS) – International Participants Only*

**Please indicate on a scale of 1 to 5 (1 = no difficulty, 5 = extreme difficulty) how much difficulty you believe you experience in the United States in each of these areas.**

1. Making friends
2. Finding food that you enjoy
3. Following rules and regulations
4. Dealing with people in authority
5. Taking an American perspective on the culture
6. Using the transportation system (e.g., buses, trains)
7. Dealing with bureaucracy (e.g., government)
8. Understanding the American value system
9. Making yourself understood
10. Seeing things from an American point of view
11. Going shopping
12. Dealing with someone who is unpleasant
13. Understanding jokes and humor
14. Accommodation (i.e., housing)
15. Going to social gatherings
16. Dealing with people staring at you
17. Communicating with people of a different ethnic group
18. Understanding ethnic or cultural differences
19. Dealing with unsatisfactory service (e.g., at restaurants)
20. Worshipping or religious practices
21. Relating to members of the opposite sex
22. Finding your way around
23. Understanding the American political system
24. Talking about yourself with others
25. Dealing with the climate
26. Understanding the United States' world view
27. Family relationships
28. The pace of life
29. Being able to see two sides of an intercultural issue

### *General Self-Efficacy Scale (GSES)*

**This questionnaire is a series of statements about your personal attitudes and traits. Read each statement and decide to what extent it describes you as you really are, not as you would like to be. Please indicate your response to each statement below by marking the number that best describes your attitude or feeling on a scale of 1 to 5 (1 = strongly disagree; 5 = strongly agree).**

1. \_\_\_\_ When I make plans, I am certain I can make them work.
2. \_\_\_\_ One of my problems is that I cannot get down to work when I should.
3. \_\_\_\_ If I can't do a job the first time, I keep trying until I can.
4. \_\_\_\_ It is difficult for me to make new friends.
5. \_\_\_\_ When I set important goals for myself, I rarely achieve them.
6. \_\_\_\_ I give up on things before completing them.
7. \_\_\_\_ If I see someone I would like to meet, I go to that person instead of waiting for him or her to come to me.
8. \_\_\_\_ I avoid facing difficulties.
9. \_\_\_\_ If something looks too complicated, I will not even bother to try it.
10. \_\_\_\_ If I meet someone interesting who is very hard to make friends with, I'll soon stop trying to make friends with that person.
11. \_\_\_\_ When I have something unpleasant to do, I stick to it until I finish it.
12. \_\_\_\_ When I decide to do something, I go right to work on it.
13. \_\_\_\_ When trying to learn something new, I soon give up if I am not initially successful.
14. \_\_\_\_ When I'm trying to become friends with someone who seems uninterested at first, I don't give up very easily.
15. \_\_\_\_ When unexpected problems occur, I don't handle them well.
16. \_\_\_\_ I avoid trying to learn new things when they look too difficult for me.
17. \_\_\_\_ Failure just makes me try harder.
18. \_\_\_\_ I do not handle myself well in social gatherings.
19. \_\_\_\_ I feel insecure about my ability to do things.
20. \_\_\_\_ I am a self-reliant person.
21. \_\_\_\_ I have acquired my friends through my personal abilities at making friends.
22. \_\_\_\_ I give up easily.
23. \_\_\_\_ I do not seem capable of dealing with most problems that come up in my life

### *Big Five Inventory (BFI)*

**Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement (1 = strongly disagree; 5 = strongly agree)**

- |  |   |
|--|---|
| 1. _____ Is talkative                            | 23. _____ Tends to be lazy                              |
| 2. _____ Tends to find fault with others         | 24. _____ Is emotionally stable, not easily upset       |
| 3. _____ Does a thorough job                     | 25. _____ Is inventive                                  |
| 4. _____ Is depressed, blue                      | 26. _____ Has an assertive personality                  |
| 5. _____ Is original, comes up with new ideas    | 27. _____ Can be cold and aloof                         |
| 6. _____ Is reserved                             | 28. _____ Perseveres until the task is finished         |
| 7. _____ Is helpful and unselfish with others    | 29. _____ Can be moody                                  |
| 8. _____ Can be somewhat careless                | 30. _____ Values artistic, aesthetic experiences        |
| 9. _____ Is relaxed, handles stress well.        | 31. _____ Is sometimes shy, inhibited                   |
| 10. _____ Is curious about many different things | 32. _____ Is considerate and kind to almost everyone    |
| 11. _____ Is full of energy                      | 33. _____ Does things efficiently                       |
| 12. _____ Starts quarrels with others            | 34. _____ Remains calm in tense situations              |
| 13. _____ Is a reliable worker                   | 35. _____ Prefers work that is routine                  |
| 14. _____ Can be tense                           | 36. _____ Is outgoing, sociable                         |
| 15. _____ Is ingenious, a deep thinker           | 37. _____ Is sometimes rude to others                   |
| 16. _____ Generates a lot of enthusiasm          | 38. _____ Makes plans and follows through with them     |
| 17. _____ Has a forgiving nature                 | 39. _____ Gets nervous easily                           |
| 18. _____ Tends to be disorganized               | 40. _____ Likes to reflect, play with ideas             |
| 19. _____ Worries a lot                          | 41. _____ Has few artistic interests                    |
| 20. _____ Has an active imagination              | 42. _____ Likes to cooperate with others                |
| 21. _____ Tends to be quiet                      | 43. _____ Is easily distracted                          |
| 22. _____ Is generally trusting                  | 44. _____ Is sophisticated in art, music, or literature |

## *Demographic Questionnaire*

**Please fill in the following survey.**

1. Age \_\_\_\_\_
2. Gender (circle one):      Male      Female
3. Major/ Field of study \_\_\_\_\_
4. Score on SAT \_\_\_\_\_ and/or ACT \_\_\_\_\_
5. Year in school? (circle one)  
**Undergraduate:** first year    second year    third year    fourth year    other \_\_\_\_\_  
**Graduate:** first year    second year    third year    fourth year    fifth year    other \_\_\_\_\_
6. Ethnicity (e.g., Caucasian, African-American, Hispanic) \_\_\_\_\_
7. Country of origin (e.g., U.S., Mexico, China) \_\_\_\_\_
8. Have you ever traveled outside your native country (e.g., outside the U.S.)? No / Yes  
If **Yes**, please specify where: \_\_\_\_\_  
\_\_\_\_\_
9. Have you ever lived (e.g., greater than 3 mos.) outside your native country? No / Yes  
If **Yes**, please specify where: \_\_\_\_\_  
\_\_\_\_\_
10. Have you visited another country within the last month? No / Yes (please specify) \_\_\_\_\_
11. Was your father born in the U.S.? (circle one)      Yes      No  
If **No**: a) Where was he born? \_\_\_\_\_  
b) At what age did he move to the U.S.? \_\_\_\_\_
12. Was your mother born in the U.S.? (circle one)      Yes      No  
If **No**: a) Where was she born? \_\_\_\_\_  
b) At what age did she move to the U.S.? \_\_\_\_\_
13. Which language(s), other than your native language, can you speak? (if none, write "None") \_\_\_\_\_  
\_\_\_\_\_
14. Approximately what percentage of your closest friends DO NOT share your nationality? \_\_\_\_\_ %